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UNIVERSITY OF TORONTO

REPORT OF THE DEAN

OF THE

FACULTY OF MEDICINE

Session 1970-1971

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Report of the Dean of the Faculty of Medicine

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THE DEAN OF THE FACULTY OF MEDICINE

As we enter a new academic year the pace of change continues to accelerate. The provincial government is about to enact legislation to establish a unicameral governing body for the University. How the professional faculties will fare under such a council is a matter of some concern. This concern stems from the fact that these faculties have relatively few votes and are unlikely to be represented on council unless a system of electoral divisions is established similar to those for the President's council.

Since the introduction of universal health care programmes by government there is increasing pressure by it on the Health Science Faculties, and Medicine in particular, to plan for and react to the community needs for health manpower and to assist and to co-operate in providing programmes for health care delivery to the community. The personnel and financial support required for such pragmatic considerations for service is not always fully appreciated by academic councils, especially in the absence of representatives of the profession concerned.

In addition to changes in the top governing structure of the University, the Faculty of Medicine after a two year study has also adopted a radical change in the composition and structure of its own council. In brief it is as follows: –

ex officio members	34
elected by basic sciences	35
elected by clinical services in hospitals	66
elected by undergraduate students	20
elected by postgraduate students	10
	165

Provision is also made for a semi-annual Faculty Assembly to receive reports from Council. It is hoped that this structure will provide a more efficient instrument for conducting Faculty business. Because it provides for representation from all departments in each participating hospital and from the student body, it is anticipated that Council decisions will be readily communicated to the rank and file of staff and students.

Another important organization which came into being during the year was the University Teaching Hospitals Association (U.T.H.A.). Mutual concerns of the University and Teaching Hospitals are dealt with by this body composed of members of the Trustees and Governors of the respective institutions. A major concern of this body has been the allocation of Health Resources Funds for the development of their educational facilities. As of this date, July 1971, governmental decisions are not yet known despite attempts by these institutions to meet all requirements over the past 4 years. A further concern of this body will be the terms of new University-Hospital Agreements, as the present agreements terminate on July 30, 1972.

In line with government plans for regional organization of health care, "the Toronto Regional Advisory Committee on Education in Health Disciplines" has been organized. The University Health Sciences, the Community Colleges of Arts and Technology, U.T.H.A., the Metropolitan Hospital Planning Council and advisers from the professional licensing bodies are all represented.

A chief term of reference is "To provide advisory or consultative services, upon request, within the area of the Toronto Health Sciences complex in respect of existing or proposed programmes in education and training of health personnel." In future it would appear that the University will be obliged to co-operate with other bodies in determining its educational programmes in the health field.

One new department, "Behavioural Science", has been approved by the Senate. Increasing demands on this department by other Health Science Faculties have demonstrated the need for this unit. Financial restrictions have made it difficult to respond fully to their requests.

The Diploma Course in Physical and Occupational Therapy has been divided into two separate courses and each has been elevated to a three-year degree course following a preliminary year in Arts and Science.

The Department of Radiology has launched an impressive research programme under the direction of Dr. Milne.

The Department of Family Practice has instituted several community health centres for teaching undergraduates and postgraduate students in the community as distinct from institutional settings.

The Department of Paediatrics has continued to mastermind the Sioux Lookout project whereby this faculty provides consultant services to the native population of Northwestern Ontario. A pilot project to train nursing personnel as physician's assistants for this area is being undertaken in association with the University School of Nursing.

Professor Harry Gear, the Chairman of Preventive Medicine, is retiring as Head of the department but will remain as a member. We have been fortunate to have had the benefit of his wide experience in the reconstruction of this department. Dr. R.W. Morgan has been appointed as Dr. Gear's successor. We are confident that his enthusiasm will be an asset in furthering the goals of this department.

Dr. Harold Johns who has given outstanding leadership in the development of the Department of Medical Biophysics is retiring from the chairmanship of the department but remains as Head of the Division of Physics within the department. We are fortunate that a capable successor as chairman was found within the department in the person of Dr. G.F. Whitmore.

One cannot escape commenting on the fact that the University is losing both of its senior officers, the President and the Chancellor, at a time of momentous change. The Faculty wishes to acknowledge their leadership and support throughout the years and to wish them well in their new endeavours.

The contribution to various fields of medicine by members of our staff has been recognized by the honours received:–

Dr. Alan Noble – Awarded the Canadian Anaesthetists' Society Medal for Meritorious Service in Anaesthesia, June 1971. Awarded the Canadian Anaesthetists' Society Prize for the best original paper based on work done in Canada and published in the Canadian Anaesthetists' Society Journal during 1970; Dr. I.M. MacKay – Appointed Honorary Physician to Her Majesty the Queen (Q.H.P.) ; Dr. E.G. Bertram – Was a Canadian Delegate to the International Congress of Anatomists in Leningrad, August 1970; Department of Art as Applied to Medicine – Medical Education Film Award (52 competing) and 2nd Award in clinical category; both received by John Kozie on behalf of the production team, Dr. H.O. Barber and AAM Staff, for film "DIZZINESS" at joint meeting of the Association of Medical Illustrators, the Biological Photographic Association and the Council on Medical T.V., Houston, Texas, August 1970. Second Film Award (54 competing) received by Nancy Joy on behalf of the production team, Dr. H.O. Barber and AAM Staff, for film "DIZZINESS" at Medical Videotape and Film Festival, sponsored by the Association of Medical Television Broadcasters, Williamsburg, Virginia, Sept. 1970. Dr. N.A. Hinton – Visiting Professor, Department of Urology, Stanford University. Editor of Infection and Immunity Section, Canadian Journal of Microbiology. Member of Microbiology Committee, National Health Grants; Dr. C.H. Best – Companion of Honour. Queen Elizabeth II Birthday Honours. Sr. Académico Honorario Extranjero, Academia Nacional de Medicina de Buenos Aires. The Banting and Best Department of Medical Research established The Charles H. Best Postdoctoral Fellowship. Appointed Honorary Patron of The Cheshire Home for the Disabled. The Dr. Charles H. Best School, Coquitlam, B.C. opened March 1971 by President of the University of British Columbia; Professor I.B. Fritz – Appointed Associate Editor of the Canadian Journal of Biochemistry. Member of the Medical Research Council Grants Committee for Metabolism. Symposium Chairman on Insulin Action, to be held in conjunction with the 50th Anniversary of the Discovery of Insulin in October 1971; Dr. R.F. Badgley –

Consultant, Scientific Group on the Development of Studies in Health Manpower, World Health Organization, 1970. Member, Sociology of Medical Education, World Health Organization, 1969; Dr. Byron G. Lane – The Ayerst Award of the Canadian Biochemical Society for 1971. Lecture entitled "The study of trace components as an approach to the characterization of cellular ribonucleates"; Dr. G.R. Williams – Named President of the Canadian Biochemical Society for 1971 at the June Annual Meeting; Professor W.R. Bruce – The First Lectureship, The William Dameshek Lectureship, American Society of Hematology, San Juan, Puerto Rico, December, 1970; Professor J.R. Cunningham – The Gordon Richards Memorial Lecturer, Canadian Association of Radiologists, Calgary, Alberta, March 1971; Professor H.E. Johns – Betty Focht Memorial Lecturer, Radiological and Medical Physics Society of New York, New York, May 1971. Awarded the Henry Marshall Tory Medal, by the Royal Society of Canada. This is a gold medal which is awarded in recognition of outstanding research, June 1971; Professor E.A. McCulloch – Medical Research Council Visiting Professorship at the University of Alberta, February 1971; Professor R. Sheinin – Medical Research Visiting Professorship in Department of Biochemistry, University of Alberta, March 1971; Dr. B. Cinader – Elected a Fellow of the Royal Society of Canada; Dr. C.H. Hollenberg – Visiting Professor, University of Manitoba; Dr. G. Steiner – President, Clinical Research Society of Toronto; Dr. E.D. Wigle – President, Canadian Society for Clinical Investigation; Dr. C. McCulloch – President of the Canadian Ophthalmological Society. Editor of the Transactions of the American Ophthalmological Society; Dr. D.P. Bryce – Elected President of American Triological Society; Elected Member of Collegium Oto-Rhino-Laryngologicum Amicitae Sacrum; Dr. J.P. Bouchard – Awarded the Junior Essay Prize for his paper on "Histographic Analysis of Human Skeletal Muscle" of the Canadian Congress of Neurological Sciences. This is only the second time the award has been made in three years since its inception, and Dr. Bouchard will present his paper at the Congress in Newfoundland, June, 1971; Dr. C.J. Porter – The Ames Award for 1971 presented by the Canadian Society of Clinical Chemists; Mrs. B. Joanne Cadeau – Awarded the Stuart Alan Hoffman Memorial Prize for 1970, for excellence in research; Mr. J.B. Davidson – Awarded The Stuart Alan Hoffman Memorial Prize for 1971, for excellence in research; Dr. R.E. Haist – Medical Research Council Visiting Professor, Department of Physiology, University of Ottawa, March 1971; Dr. J.W. Scott – President, Academy of Medicine, Toronto, 1970–71; Dr. H.B. Kedward – Visiting Professor in Social Medicine, Memorial University, Newfoundland; Dr. O. Hornykiewicz – Vice-president, American Association for Research in Nervous and Mental Disease, 1970; Dr. P.M. Yap – Contributing Editor – Comments on Contemporary Psychiatry, Edited by Dr. J. Mendels, University of Pennsylvania; Consultant, Advisory Board of *Ethos*, edited by Professors Goldschmidt and Price Williams, University of California; Dr. W.R. Drucker – Visiting Professor, Tulane University, New Orleans; Sommer Memorial Guest Lecturer; Dr. G.A. Farrow – Canadian Urological Association prize essay (with Dr. W. Wagner); Dr. R.J. Ginsberg – McLaughlin Travelling Fellowship (1970); Visiting Professor, Department of Thoracic Surgery, University of Texas Medical Branch, Galveston, Texas (1970); Dr. R.W. Jackson – Awarded Lister Prize in Surgery, 1970, University of Toronto; Dr. I. Macnab – Visiting Professor, University of Florida, Gainsville; Surgeon-in-Chief pro tem, Rhode Island Hospital; Dr. F.G. Pearson – Visiting Professor, Maine Medical Centre, Portland; Dr. G.N. Ranking and Dr. G.A. Harry – Prize Essay, Canadian Urological Association, 1970; Dr. R.B. Salter – Awarded the Order of the Academic Cane for 1971 by the Department of Orthopaedic Surgery, University of Southern California, Los Angeles; Dr. J. Schatzker – Winner of the Edward Samson Award, The Canadian Orthopaedic Association, for best Orthopaedic Research in 1970 on the subject of "Non-unions of the Odontoid Process on Experimental Investigation"; Dr. J.W. Davidson – Visiting Lecturer to McMaster University, Hamilton, Ontario; Dr. D.L. Gilday – Visiting Professor to Emory University, Atlanta, Georgia; Dr. D.C.F. Harwood-Nash – Visiting Professor to the Melincar Institute of Radiology, St. Louis; Professor R.B. Holmes – President of Canadian Professors of Radiology; Director of

the Radiological Society of North America; Dr. D.L. McRae – Visiting Professor to the Columbia Presbyterian Medical Center, New York, University of Tennessee, and the University of Wisconsin; Dr. E.N.C. Milne – Was an invited participant to the N.I.H. Seminar on Derivation of Quantitative Data from Radiographs; Visiting Professor to the University of Minnesota; Visiting Professor to the University of Colorado; Visiting Professor to the University of Kentucky; Founding Member and first Secretary-Treasurer of the Fleischner Society; Dr. B.J. Reilly – Visiting Professor to Dalhousie University; Visiting Professor to McGill University.

Visitors:
During the academic session many prominent physicians and scientists visited the Faculty. These included:

Department of Anaesthesia: Professor James Eckenhoff of Northwestern University Medical School who gave the Twelfth Doctor Harry Shields Lecture; Professor H.B. Fairley of the University of California Medical Center, San Francisco, who gave the First Murray Mendelson Memorial Lecture; Professor Gordon MacDowall, University of Leeds; Dr. J.B. Forrest, Glasgow.

Banting & Best Department of Medical Research: Dr. P. Moens, York University; Dr. J.L. Strominger, Harvard University; Dr. G.M. Kellerman, Monash University; Dr. Paul Srere, Veterans' Administration Hospital, Dallas; Dr. E.R. Stadtman, National Heart and Lung Institute; Dr. M. Rodbell, National Institutes of Health; Dr. A.M. Scanu, University of Chicago; Dr. I.R. Brown, University of Calgary; Dr. C.J. Ingles, University of California, San Francisco; Dr. C. Williams, Harvard University; Dr. J. Kornblatt, University of Toronto; Dr. T. Pederson, Albert Einstein College of Medicine of Yeshiva University; Sir Hans A. Krebs, Oxford, England; Dr. A.L. Jones, University of California, San Francisco; Dr. S. Goldstein, McMaster University.

Department of Behavioural Science: Professor O.W. Anderson, University of Chicago; Professor S. Bloom, Mount Sinai School of Medicine; Dr. G. Clarkson, Deputy Minister of Health & Welfare, New Brunswick; Professor F. Davis, University of California; Professor J. Elinson, Columbia University; Dr. M.R. Elliott, former Deputy Minister of Health, Province of Manitoba; Professor M. Field, Harvard University; Professor D.G. Fish, University of Manitoba; Dr. G.W. Goldthorpe, Sioux Lookout, Ontario; Dr. J. Hamilton, McMaster University; Dr. D.J. Hosking, University of Saskatchewan; Dr. K. Paproski, University of Alberta; Dr. H.R. Robertson, National Science Council; Dr. E. Vayda, McMaster University; Mr. D.P. Willis, Millbank Memorial Fund, New York; Dr. S. Wolfe, Meharry Medical College.

Department of Medicine: Dr. C. Albahary, Paris; Dr. D.R. Bangham, London; Dr. E. Beutler, Duarte, California; Dr. R. Boucher, Montreal; Dr. L. Brumpt, Paris; Dr. R.D. Bulbrook, London; Dr. Y. Clermont, Montreal; Dr. J. Curtis, Houston, Texas; Dr. A.J. Duggan, London; Dr. I. Fox, Durham, North Carolina; Dr. E. Freirich, Houston, Texas; Dr. C. Gale, Seattle; Dr. R.A. Good, Minneapolis; Dr. F.C. Greenwood, Honolulu; Dr. P. Hahn, Vancouver; Dr. H. Harris, London; Dr. E. Henderson, Bethesda, Maryland; Dr. T. Howes, Houston, Texas; Dr. W.D. Johnson, Milwaukee; Dr. E.A. Kabat, New York; Dr. S. Kety, Boston; Dr. B.M. Kobba, Sierra Leone; Dr. A. Malkin, Toronto; Dr. A. Mich, Hamburg; Dr. S.P. Mistillis, New South Wales; Dr. J.J. Morgan, New South Wales; Dr. E. Mosbach, New York; Dr. M. Oka, Helsinki; Dr. K. Pierkarski, Waterloo, Ontario; Dr. P. Richards, London; Professor J. Rodewald, Hamburg; Dr. H. Roediger, Hamburg; Dr. L. Rosenberg, New Haven, Connecticut; Dr. R.E. Rosenfield, New York; Dr. G. Russell, Oxford; Dr. D.A. Sherim, British Columbia; Dr. C.J. Smyth, Boulder, Colorado; Dr. D. Streeten, Syracuse, New York; Dr. D.H. Trapnell, London; Dr. J. Weyman, Montreal.

Department of Ophthalmology: Dr. Harold F. Falls, Ann Arbor, Michigan, gave the 13th Walter Wright Lecture; Dr. Fred Blodi, University of Iowa; Dr. Peter H. Bellen, State University of New York; Dr. William H. Spencer, University of California, San Francisco.

Department of Otolaryngology: Dr. Paul Fugere, Université Laval; Dr. Robert Rubin, Albert Einstein University, New York; Dr. Garth Hemenway, Denver; Professor Donald Harrison, University of London; Mr. Ronald Macbeth, Oxford.

Department of Paediatrics: Professor Mary Ellen Avery, Montreal Children's Hospital; Dr. Sonja Balsan, Paris; Dr. Paul Beeson, Oxford University; Dr. Niels E. Brandstrup, Denmark; Dr. Jean Cortner, State University of New York at Buffalo; Dr. D. Edworthy, Kelowna, B.C.; Dr. G. Enhorning, Stockholm; Dr. Douglas Gairdner, Cambridge; Dr. W. Ghali, Zambia; Dr. Ghislaine Gilbert, Montreal; Professor Robert Good, University of Minneapolis; Dr. Edward W. Green, Detroit; Dr. Robert J. Haggerty, University of Rochester; Dr. Dorothy M. Horstmann, Yale University; Dr. Sydney Israels, University of British Columbia; Dr. William Kitchen, University of Melbourne; Dr. Bertil Lindquist, University of Lund, Sweden; Dr. Paul Mairaux, University of Louvain, Belgium; Professor Alex Minkowsky, Paris; Dr. M.W. Partington, Kingston, Ontario; Miss Khemphet Polsena, Laos; Dr. Michael Rogers, Natal, South Africa; Dr. Leon Rosenberg, Yale University; Dr. Richard Rowe, Johns Hopkins Hospital; Mrs. Margaret Semple, Children's Hospital Detroit; Dr. W. Shah, Lusaka, Zambia; Professor J.M. Tanner, University of London; Dr. David Wade, Edinburgh; Dr. Nguyin thii Xiem, North Viet Nam; Dr. Rolf Zetterstrom, Stockholm; Dr. Alvin Zipursky, McMaster University; Miss J.C. Zulch, The Macmillan Co., New York.

Department of Pathology: Dr. M.J. Kaplan, Case Western Reserve University; Dr. A.G. Sanders, Oxford; Dr. W.H. Clark, Jr., Temple University; Dr. L.M. Reid, London; Dr. M.E. Conrad, Walter Reed Army Institute of Research; Dr. H. Popper, Mount Sinai School of Medicine, New York; Professor R. Hudson, London; Dr. F. Sanger, Cambridge; Dr. H. Shin, Johns Hopkins School of Medicine; Dr. H.M. Frost, Detroit; Dr. M. Brain, McMaster University; Dr. J. Richardson, Massachusetts General Hospital.

Department of Pathological Chemistry: Dr. C.T. Caskey, National Institutes of Health, Bethesda; Dr. C.D. Kochakian, University of Alabama; Dr. Russell Hilf, University of Rochester.

Department of Pharmacology: Dr. O.H. Viveros, University of Chile; Dr. A. Tenehouse, McGill University; Dr. B. Witkop, National Institutes of Health, Bethesda; Dr. P. van Oordt, Utrecht, The Netherlands; Dr. S. Thesleff, Lunds Universitet, Sweden; Dr. E. Beutler, Duarte, California; Dr. C.M. Smith, State University of New York at Buffalo; Dr. L.H. Piette, University of Hawaii; Dr. B. Grafstein, Cornell Medical College, New York; Dr. R. Blostein, McGill University; Dr. C.W. Gowdey, University of Western Ontario; Dr. F. Takenaka, Kumamoto University Medical School, Japan; Dr. P.C. Dandiya, Jaipur, India.

Department of Physiology: Dr. S. Tarui, Osaka University; Dr. J.J. Kulikowski, University of Cambridge; Dr. M. Goodman, University of Massachusetts; Dr. G. Werner, University of Pittsburgh; Dr. S.J. Bleicher, Downstate Medical Center, New York; Dr. R.W. Sperry, California Institute of Technology; Dr. J.J. Dreifuss, University of Geneva Medical School; Dr. H. Davenport, University of Michigan; Dr. M. Beznak, University of Ottawa; Dr. G.J. Hetenyi, University of Ottawa; Dr. D. Hatcher, Queen's University; Dr. G. Mogensen, University of Western Ontario; Dr. J.A.F. Stevenson, University of Western Ontario.

Department of Radiology: Dr. H.L. Abrams, Harvard Medical School; Dr. M.J. Chamberlain, Birmingham; Dr. D.H. Cummack, Edinburgh; Dr. Harry Graffiths, Harvard University; Dr. Ian Kerr, London; Dr. R. McReady, London; Dr. R.E. Maltais, University of Montreal; Dr. H.D. Rosenbaum, University of Kentucky; Dr. E.G. Theros, Armed Forces Institute of Pathology, Washington, D.C.; Dr. David Trapnell, London; Dr. H.M. Worth, Vancouver.

Department of Surgery: Mr. L.N. Allen, London; Lord Brock, Royal College of Surgeons; Professor William Burnett, University of Queensland; Professor Gordon Cummings, Birmingham; Professor Horace Davenport, University of Michigan as this year's Balfour Lecturer; Professor Charles Drake, University of Western Ontario; Professor W.F. Enneking, University of Florida; Professor E.A. Elebute, University of Lagos; Professor George Fegan, University of Dublin; Dr. John R.P. Gibbons, London; Professor W.D. Johnson, Marquette University; Professor V.V. Kakkar, London; Professor Andrew Kay, University of Glasgow; Professor John Loewenthal, University of Sydney, this year's Sims Commonwealth Travelling Professor; Professor N.T. McPhedran, University of Calgary; Professor G.F. Murnaghan, University of Sydney; Professor Marshall Orloff, University of California; Professor W.B. Patterson, University of Rochester; Professor John E. Rhoads, University of Pennsylvania; Dr. Rex Rothwell-Jackson, St. Bartholomew's Hospital, London; Dr. Richard Schneider, University of Michigan; Professor John Spitzer, Hahnemann Medical College, Philadelphia; Professor David State, Yeshiva University; Professor Torg Stoog, University of Uppsala; Professor Dean Warren, University of Miami; Professor Paul Yakovlev, Harvard University; The Academic Plastic Surgery Forum; The North American Travelling Fellows; The Upstate Society of Thoracic Surgeons headed by Dr. Harvey W. Kausel.

Institute of Medical Science: Dr. R. Boucher, Clinical Research Institute, Montreal; Dr. H. Harris, University of London; Dr. S. Kety, Massachusetts General Hospital; Dr. S.P. Mistillis, Royal Prince Alfred Hospital, Camperdown, Australia; Dr. E. Mosbach, Public Health Research Institute of the City of New York; Dr. L. Rosenberg, Yale University; Dr. G. Russell, Nuffield Orthopaedic Laboratory, Oxford; Dr. D. Streeten, Upstate Medical Center, Syracuse.

I should like to thank the Medical Alumni for their continued support of our student bursary, scholarship and training programme.

Finally, I should like to thank all those who by their donations have so generously supported our fellowship, scholarship and research programmes.

Research:
Abbott Laboratories Limited; Alcoholism and Drug Addiction Foundation; American Medical Association; The Atkinson Charitable Foundation; H.M. Austin Estate; Banting Research Foundation; Charles H. Best Foundation; J.P. Bickell Foundation; J.B. Billes Estate; Lillian Mary Black Estate; N.B. Brennan Estate; Burroughs, Wellcome and Company (Canada); Canadian Arthritis and Rheumatism Society; The Canada Council; Canadian Cystic Fibrosis Association; Canadian Diabetic Association; Canadian Heart Foundation; Canadian Hepatic Association; Canadian International Development Agency; Canadian Life Insurance Association; J. Clemens Estate; The Commonwealth Scholarship Commission; The Charlie Conacher Fund; The Connaught Medical Research Laboratories; The Crusade Against Leukemia; The James H. Cummings Foundation; The Defence Research Board; Denison Mines Limited; Department of Health (Provincial); Department of National Health and Welfare; The J.S. Dickson Estate; The Fraternal Order of Eagles, Maple Leaf Aerie 2311; Eaton Endowment Account; T. Foster Estate; Carey E. Fox Foundation; The Anna Fuller Fund; P.R. Gairdner; Geigy (Canada) Limited; Flora C. Gray Estate; The J.F. Hartford Foundation; Hoechst Pharmaceuticals; The Nelson Arthur Hyland Foundation; G. l'Anson Estate; I.G. Ingle; Insulin Trust Fund; M.B. Kerbel Ophthalmology

Foundation; Elli Lilly Company; R. Samuel McLaughlin Foundation; The McLean Foundation; Medical Research Council of Canada; Merck and Company Incorporated; Millbank Memorial Fund; the Muscular Dystrophy Association; National Academy of Science; National Cancer Institute of Canada; National Research Council; National Sanitorium Association; Ontario Cancer Treatment and Research Foundation; Ontario Heart Foundation; Ontario Hospital Services Commission (Eye Bank); Ontario Mental Health Association; Ontario Tuberculosis Association (Ontario Thoracic Society); The Independent Order of Odd Fellows; Pfizer Company Limited; James Picker Society; The J. Helen Playfair Foundation; P.S.I. Foundation; The Rebekah Assembly of the I.O.O.F.; the Ethel Rogers Estate; The Selkirk Fund; C.D. Serle and Company Canada Limited; Dr. M. Shea; I.E. Smith Fund; C. Smythe Fund; the Stapells Research Foundation; M. Treneman Estate; Tuberculosis and Respiratory Disease Association; United States National Institutes of Health; W. Garfield Weston Charitable Foundation; the Workmen's Compensation Board.

A.L. CHUTE

REPORT ON REGISTRATION, SESSION 1971–1972

First Medical Year	224
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Fourth Medical Year	184
Art as Applied to Medicine	15
Occupational Therapy (Degree Course)	15
Physical Therapy (Degree Course)	54
Physical and Occupational Therapy (Diploma Course)	184
Diploma in Speech Pathology and Audiology	32
Diploma in Anaesthesia	28
Diploma in Clinical Chemistry	5
Diploma in Medical Radiology	43
Diploma in Psychiatry	74
Other Postgraduate Students	1,038
	2,337

FELLOWSHIPS, SCHOLARSHIPS, MEDALS AND PRIZES

GRADUATE

Ursula E. Bangs I.O.D.E. Fellowship	C. Felderhof, B.Sc., M.D.
Chisholm Memorial Fellowship	D. Gornall, B.Sc., M.Sc., Ph.D.
Caven Memorial Fellowship	H. Mori, M.D., D.M.Sc.
William Goldie Prize	I. Broder, M.D., F.R.C.P.(C)
Arthur F. Haasz Fellowship	A.R. Guansing, M.D.
R.I. Harris Memorial Prize	J.A. Israel, M.D.
Stuart Alan Hoffman Memorial Prize	J.B. Davidson, B.Sc., M.Sc.
Arch Hutchison Fellowship	A.R. Guansing, M.D.
Frances Esther Hutchison Fellowship	A.R. Guansing, M.D.
Inez Gwendolyn Inglee Research Grant	U. de Boni, B.Sc., M.A.
Karen Jackson Fellowship	A. Viti, M.D.
Minister of Health Gold Medal	D.E. Stewart, M.D.
James H. Richardson Research Fellowship	E. Hisaki, D.D.S., Dipl. Orthodontics, M.Sc.
Edward Christie Stevens Fellowship	R. Baillie, B.Sc., Ph.D.
John Alexander Stewart Fellowships	D.H. Osmond, B.S.A., M.S.A., Ph.D. C. Schiller, Ph.D. K. Desai, Ph.D.
Helen L. Vanderveer Fellowship	W.S. Hwang, M.D., B.S., F.R.C.P.(C)

UNDERGRADUATE

Fourth Medical Year

Cody Gold Medal	D.J. McNeely
Cody Silver Medal	C. Shustik
Cody Silver Medal	Miss J.E. Haglund
Dr. Benjamin W. Appleton Prize in Psychiatry	D.J. McNeely

J.P. Boley Prize in Ophthalmology	W.N. Grieve
Louis Browner Memorial Scholarship	Mrs. F. Waterman
Butterworth Prize	Miss L.J. Dempsey
Irving Heward Cameron Undergraduate Scholarship	R.M. Paulsen
Kathleen Chambers Memorial Award	Miss J.E. Haglund
Chappell Prize in Clinical Surgery	W.F. Bennett
Dr. Jacob Goldstein Scholarship	S. Hafner
R.I. Harris Undergraduate Award	B.W. Malcolm
Hendry Memorial Scholarship	J.R.B. Bristowe
Frank W. Horner Gold Medal	C. Shustik
Issei Scholarship in Medicine and Surgery	J.P. Caldwell
Dr. Louis Kagan Memorial Award	W.N. Grieve
Dr. Mitchell Kohan Scholarship	D.J. McNeely
Medical Alumni Association Scholarship	Miss J.E. Haglund
Ellen Mickle Fellowship	C. Shustik
Ontario Medical Association Prize in Preventive Medicine	D.W. Haist
Dr. Don L. Robison Memorial Award	N.C. Colman
Dr. Roy Simpson Scholarship in Paediatrics	C. Shustik
Samuel J. Streight, O.B.E., M.D., Scholarship in Internal Medicine	E.L. Book

Third Medical Year

Bristol Laboratories of Canada Prize	F. Rosenberg
Dr. F.J. Colling Scholarships (renewals)	J.C. Gustaffson J.S. Lovering W.J. Peters L. Robicsek J. Tokaruk Miss S.J. Weckman
Franckel Memorial Award	J.D.H. Silverberg
Charles E. Frosst Medical Scholarship	Mrs. A.R. Rachlis
Geoffrey Samuel Gangbar Memorial Prize	Miss D.S. Fulton
Ronald S. Saddington Medal in Pathology	J.D.H. Silverberg
Dr. C.S. Wainwright Memorial Scholarships (renewals)	Miss P.A. Clifford I. Horowitz R.M.A. Richardson J.R. Scarrow
Walter F. Watkins Scholarships	J.F. Fitzgibbons G.F. Goldlist D.J. Nerenberg R.M.A. Richardson L.H. Rossman H.D. Strauss

Second Medical Year

Dr. F.J. Colling Scholarships	R. Andreychuk R. Hyland Mrs. R. Moses E. Urovitz B. Wisenberg W. Wyatt
John Copp Bursary	J.F. Kellam
William Edward Corlett Memorial Scholarship (renewal)	I.D. McLean
Dr. and Mrs. M.A. Pollack Award	V. Likwornik
Dr. C.S. Wainwright Memorial Scholarships (renewals)	J. Barclay R.F. Grossman A. Korda R.H. Stubbs
Walter F. Watkins Scholarships	K. Berris M. Brewer L. Koenig Mrs. M. Retter L. Rotstein P. Strawbridge D. Wesson

First Medical Year

Dr. Thomas Arnold McCormick Scholarship	W.B. Soutar
Posluns Brothers Scholarship	W.B. Soutar
Dr. C.S. Wainwright Scholarships	R.J. Bowers
	B.J. Goldlist
	G.R. Harrigan
	S.C.T. Lam
Walter F. Watkins Scholarships	W. K. Cheng
	B.H. Dingle
	D.W.M. George
	J.E. Kudlow
	R. Maggisano
	M.D. Minden
	D.R. Parkinson
	D.M. Shrives
	Miss L.P. Tham
John Zoberman Scholarship	H.R. Cohen

Division of Rehabilitation Medicine

Beatrice Hally Memorial Prize	Miss J.E. Buchanan

MEDICAL SOCIETY

(September 1970 to June 1971)

Honorary President	Dean A.L. Chute
President	R.M. Paulsen
Vice-President	P.T. Randall
Treasurer	J.M. Bain
Executive Secretary	R.S. Davies

The year 1970–71 saw the Medical Society involved in many interesting projects both academic and non-academic, political and non-political. This was the year that a major change occurred in the structure of our Faculty Government, resulting in a significant decrease in the size of Faculty Council, with a shift of emphasis to government by representation. The Medical Society was actively involved in these deliberations. Members participated in the special meetings of Faculty Council, as well as serving on the various preliminary committees which had been established to draw up the proposals for the new structure. Members of the student body have a significant membership in the new structure of Faculty Council and we look forward to active and constructive participation by all concerned.

Vertigo 70, an encounter on drugs, was presented under the skilful management of Mel Borins, Marsha Werb, Ed Hamer, *et al.* It provided not only an educational and informative week, but also laid the foundation for future study into the problem of drug abuse, and the introduction of this topic into the medical curriculum.

Daffydil continued its tradition of superb entertainment, and its Director Ross Reid, and Producer Ted Rumble, deserve a great deal of credit for the success of *Daffydil 70*.

Rudy Gasparelli, our Social Director, organized a very successful Formal at the King Edward Hotel.

Paul Finnegan, with the helpful co-operation of Dean and Mrs. Chute, organized an Initiation and Orientation Programme for the students entering the First Medical Year. The weatherman co-operated to provide perfect weather for a most enjoyable day at the Dean's farm.

The President attended the ACMC Meeting in Winnipeg, and together with Dr. J.S. Thompson, participated in a panel discussion on "Student Participation in Faculty Affairs," the transcript of which was published in the ACMC News.

The Canadian Association of Medical Students ceased to exist as a national organization, and steps were taken to organize groups of medical students on a provincial basis, with assistance and guidance from the various provincial parent Medical Associations.

The *University of Toronto Medical Journal* under the able Co-editors, Titus Owolabi and Fred Gentili, published five excellent issues this year, with Michael Pascoe winning the Webster Prize.

The *Synapse*, a joint publication of the Medical Society and the Faculty, was delivered to students and staff alike. Our representative on the Synapse Editorial Board was Andy Osuszek.

It was an eventful and enjoyable year for all concerned in the Medical Society, and we wish the new President, Chandru Sajnani, all the best for the year 1971–72.

R.M. Paulsen

DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of Professor K.J.R. Wightman

The work of the Division continues to expand both in volume and complexity.

In the field of postgraduate education the number of students registered who are Internes, Residents, and Fellows has increased year by year, partly because of an actual increase in the numbers in the system and partly because of an increased effort to make certain that all are registered. One hundred and sixty students were taking Diploma courses, eight hundred and seventy-four were internes, residents and fellows and the total enrolment, as reported to the Division of Statistics and Records, was 1,103. The instruction given these trainees is a blend of lecture and seminar with bedside teaching and other types of teaching based on problems presented by patients. It seems likely that this process will become more and more formal as time goes on. It is also quite evident that the evaluation process will also be improved. Many of the departments are introducing course tests of various sorts. Some of these are devised here. Others are purchased from institutions in the United States. The Royal College of Physicians and Surgeons of Canada is placing greater and greater reliance on the universities for ensuring that the training of specialists is adequately supervised and carefully planned. They also anticipate that the medical schools will carry a greater share of the responsibility for evaluation progress.

In the field of continuing education there are two areas of endeavour. Thirty short courses were offered in a variety of subjects, for both general practitioners and specialists. A total of one thousand seven hundred and eighty-one doctors from all across Canada registered in these courses. An intensive advanced course in Medicine, Surgery, and Obstetrics was offered in the summer as usual and 105 were registered in it. An attempt to evaluate these courses is being made with the assistance of Dr. John Flowers, whose background is that of an educationist. In general, they are received enthusiastically by the students. However, one hopes to have more objective evidence that they are accomplishing the aims anticipated by those who put them on.

In addition, clinicians visited eight communities a number of times. A total of twenty-four of these so-called decentralized clinics were held in such places as Dryden, Kapuskasing, Kirkland Lake, Bracebridge, Welland and Port Colborne, Sault Ste Marie, Thunder Bay, and Timmins. The format of these visits has remained the same for many years but they continue to excite favourable comment. The concept that the community hospital is the natural and probably the most effective arena for continuing medical education is becoming more and more popular. It is quite possible that these clinics help to produce that kind of atmosphere. Attempts at evaluation are still in their infancy.

DIVISION OF REHABILITATION MEDICINE

Under the direction of Professor A.T. Jousse

There have been several important happenings within the Division of Rehabilitation Medicine during the year 1970–71.

The first is the establishing of the degree programme in Physical Therapy and in Occupational Therapy. On March 12, 1971 the Senate of the University passed statutes whereby the separate four-year undergraduate programme leading to the degree of Bachelor of Science (O.T.) and Bachelor of Science (P.T.) were approved. The course will commence in September 1971. The existing three-year combined diploma programme will be phased out.

The second is the development of new facilities to serve the needs of the Department of Rehabilitation Medicine in St. Michael's Hospital, including a rehabilitation ward of 8 beds, under the direction of Dr. J. Houston.

The third is the addition of Dr. Dornan to the staff of Rehabilitation Medicine at the Toronto Western Hospital and of Dr. Sowden to the position of Director of Rehabilitation Medicine at Sunnybrook Hospital, these appointments to be taken up July 1, 1971 and September 1, 1971 respectively.

RESEARCH

C.M. Godfrey carried out research as follows: (1) an investigation into the effect of foot mass on prosthetic gait; (2) an investigation into stability and energy factors with various knee joints in the prosthetic limb; (3) development of an improved intraoral, electronic voice production unit.

SCHOLARLY ADDRESSES

J.S. Crawford, "Venous Thrombosis After Fractures of the Upper End of the Femur – a Phlebographic Study of the Effect of Prophylactic Anticoagulation," Canadian Association of Physical Medicine and Rehabilitation, Saskatoon, August 12 to August 15, 1970.

Godfrey, C.M., Rehabilitation Programs for Medical Patients: The American College of Sports Medicine and Canadian Association of Sports Sciences, Annual Meeting, May 11, 1971; Essex County Medical Society, Overseas Medical Aid, April 21, 1971; Toronto General Hospital School of Nursing Alumni-Care Medico in Indonesia, February 1, 1971; Board of Governors of Care of Canada, Care Medico – Indonesia, January 27, 1971; Brant County Medical Society, "The Child with the Learning Disability," October 7, 1970; A Physical Fitness Program in a General Hospital, Canadian Medical Association Meeting, June 16, 1970; r.n.a.o. – Cathedral Branch, Toronto – The Perceptually Handicapped Child, June 8, 1970.

PUBLICATIONS

Godfrey, C.M. "Physical Therapy for Rheumatic Diseases" (*Canadian Family Physician*, vol. 17, Jan. 1971, pp. 51–3).

Jousse, A.T. "Some Important Concepts for the Rehabilitation of the Physically Disabled" (*Ontario Medical Review*, vol. 37, 1970, pp. 479–81).

DIVISION OF INSTRUCTIONAL MEDIA SERVICES

Under the direction of Dr. J.K. Conway

This year represented the first full year of operation for all four sections of the Division. The basic criteria for divisional development are still being worked out, so that the usual comparison with previous years is not yet feasible. As a base-line year, some

real progress was made in ironing out service difficulties and defining the realistic needs of each service area. In some cases these needs are not insignificant and are still unsatisfied. The Division's services parallel the development of educational activities and as these grow through the evolution of the curriculum, so does the role of the Division.

Photographic Section
This section, the first to become operational, has begun to develop consistent and efficient patterns of service. Quality of service has been stressed and the benefits of this approach have been accepted by the faculty. This has clearly been recognized, for example, in the area of electron microscopy, where the section's staff has now assumed responsibilities previously handled by existing technicians.

It has become clear that a gap exists in available photographic services. This falls in the area of 16-mm film production. Limited production and editing facilities are required for the development of stand-alone films and/or insert material that is used as part of television teaching materials. A truly flexible and responsive photographic section will be capable of handling both still *and* motion assignments throughout the building and Teaching Hospitals.

Art Section
This section has experienced only incremental demands on its resources through the year. Clearly, the geographical remoteness of the section from the Medical Sciences Building has hindered its development. There is no question that all the sections of the Division must be physically and functionally integrated. To this end, several of the Art Section staff have been moved over to an area in the television section. Planning for the art section recognizes that eventually all the staff must be located in the Medical Sciences Building.

Projection Section
This section bore the brunt of the faculty's first large-scale use of the lecture areas in the building. It is the most heavily used area of the Division's responsibilities, handling on the average 75–80 assignments a week through the teaching year. The scheduling of these assignments and the co-ordination of student projectionists who handle them is still being refined but the basic system is now efficient and smooth.

Television Section
The television section is slowly beginning to realize its potential. It became partly operational six months ago, is fully operational as of this June, and has in a short period of time produced a wide variety of instructional material of high quality. Assignments have been undertaken for Faculty of Medicine applications both within the building and in the Teaching Hospitals. Other Health Science Divisions (e.g. Nursing, P & HE, Pharmacy) are also making use of the resources. Projects have been proposed for the further development of television in the Teaching Hospitals and for production of continuing medical education materials for open broadcast television.

The lack of sufficient staff in the section remains a critical problem. The television system in the Medical Sciences Building is a sophisticated one, incorporating production, distribution, and maintenance components, with each component requiring its own staff complement. Further staff will be necessary if the components are to be brought together as a truly effective system that can service as wide a group of users as possible.

DIVISION OF LABORATORY ANIMAL SCIENCE

Under the direction of Dr. L.R. Christensen

The most significant event affecting the Division in the year 1970–71 was the proclamation of The Animals for Research Act (formerly Bill 194) on May 3, and publica-

tion of the detailed regulations implementing it. Briefly, the Act requires that dogs and cats be obtained directly from Pounds, rather than from dealers; that a University Committee review and approve vertebrate animal experiments and that animal facilities and care meet detailed standards set forth in the regulations.

Prior to proclamation of the Act, tentative plans for procurement and delivery of pound animals had been formulated and a truck specifically designed for this purpose purchased. Following proclamation, a number of meetings were held with Pound and Government officials to work out mutually satisfactory details of compliance with the law. Aside from a few temporary transition problems, pound procurement is working well and it appears that we will be able to obtain adequate numbers of impounded, unwanted dogs and cats otherwise destined for destruction. A number of the affiliated hospitals have expressed interest in utilizing our pound procurement service rather than setting up their own and we anticipate being able to accommodate them.

The University Committee on Animal Care has been designated the animal committee required under the Act. In the Faculty of Medicine, the Faculty Advisory Committee on Animal Care and Facilities reviews individual research protocols involving animals and forwards them to the University Committee for final action.

The integration and renovation of animal facilities started several years ago, together with the animal technician training programmes initiated by the Division, have resulted in improvements such that no significant difficulty in meeting the regulations is anticipated. As a matter of fact, the government has used photographs of our facilities to illustrate a brochure explaining the new law.

The use of animals, which showed a continuous rise in 1969–70, now appears to have plateaued and has been fairly constant this year. This is due in part to the fact that the majority of investigators moved into the MSB during the last year and in part to financial constraints on research budgets this year.

The completion of the integration of the Faculty of Medicine facilities and stabilization of the animal census allow, for the first time, some estimation of the efficiency and economy to be realized by our modern facilities. Exact figures on total animal use prior to the integration under DLAS are not available, but an educated guess would be that the total now is significantly greater than in the past. Nevertheless, the number of animal technicians has been reduced from 43 to 34 and standards of care and husbandry have been improved markedly.

DLAS has been assigned responsibility for animal technician training for the entire University. Plans are being formulated to meet this responsibility, based on our experience with the various pilot training courses carried on during the past three years. The programme will be designed to mesh with the certification programme of the Canadian Association for Laboratory Animal Science. Certification by the latter is now recognized in the new job classifications of the University. Nine members of our staff have received, or have recently qualified for, certification.

The disease research and control laboratory, under Dr. Fletch, through its continuing surveys of animal suppliers, is increasingly able to provide investigators with information on the comparative quality of animals from various sources. As part of the programme, suppliers are made aware of our findings and in several instances we have been asked to co-operate in improving their stocks and practices.

A recent contract has been negotiated for the laboratory to undertake serological surveys for indigenous murine viruses in stocks produced both by commercial firms and in our own institutions. Information gained is expected to be valuable not only for investigators using these animals but also in our long-range programme for improving animal quality.

Several cases of tuberculosis in our primates, together with a recent human case of Herpes B infection in another institution are cause for concern. Interim regulations for safe handling of these animals have been set up and further steps to reduce or eliminate these hazards are under study.

Numerous visitors from Canada and abroad, contemplating renovation or new animal facilities, have toured the MSB. The Director and professional staff are con-

stantly consulted by other institutions regarding design of facilities, equipment, administrative and management practices, and training programmes.

DLAS was host to the Ontario Veterinary Association Laboratory Animal Symposium in November. One session concerned the design and operation of large animal facilities and featured tours of the MSB facilities to illustrate the principles presented.

The Director has appeared on several television and radio programmes in support of the Animals for Research Act and the use of animals in biomedical research. Fortunately there has been a minimum of propaganda directed specifically at the University as a result of the public controversy over animal experimentation, engendered by the Animals for Research Act.

APPENDIX I

Animals used, Faculty of Medicine, 1970–71

Dogs	1,540
Cats	683
Primates	117
Rabbits	4,302
G. Pigs	4,982
Hamsters	48
Rats	30,587
Mice	51,474
Fowl	78
Calves	3
Sheep	15
Pigs	6
Goats	8
Turtles	360
Frogs	1,677
Woodchucks	17
	95,897

APPENDIX II

Average Daily Animal Census, F. of M. 1970–71

Dogs	150
Cats	40
Primates	15
Rabbits	750
G. Pigs	280
Hamsters	40
Rats	2,500
Mice	7,000
Fowl	20
Calves	0
Sheep	2
Pigs	1
Goats	3
Turtles	30
Frogs	80
Woodchucks	8

RESEARCH

A field study is under way to determine the efficacy of immunizing random dogs against distemper at time of pick-up from the pounds, using an attenuated live virus vaccine. Before the proclamation of the Animals for Research Act, when dogs were obtained from dealers, such immediate immunization was impossible. Dogs were immunized upon arrival at DLAS and the incidence of distemper reached as high as 20 per cent. Limited experience with the new system to date is encouraging.

Latent infection of rodent colonies with viral agents is common. These viruses may: (*a*) produce clinical disease under experimental stress; (*b*) be oncogenic (poly-

oma); (*c*) produce mixed infections in studies with other viruses (Friend virus and mouse hepatitis virus); (*d*) bias experimental results in more subtle ways. Surveys for the presence of such viruses in rodent colonies have been conducted to a limited extent in the United States, but the status of Canadian animals is unknown at present. A serological survey using microtitre complement-fixation and haemagglutination-inhibition tests has been initiated for institutional and commercial mouse colonies.

The presence and distribution of mouse hepatitis virus, lymphocytic choriomeningitis (a potential zoonoses) RHEO 3, Sendai virus, Kilham (K) virus, Theiler's GD VII virus, pneumonia virus of mice (PVM), and polyoma will be determined. Information gained will serve four general purposes: (*a*) investigators will know the status of their experimental animals in response to these agents; (*b*) the variety and incidence of such agents in a colony will act as an indicator of the overall quality of the animals and the husbandry standards; (*c*) continued monitoring of an individual colony will afford an index of the efficacy of any disease control measures instituted; (*d*) serological findings can be correlated with the common necropsy finding of respiratory diseases, usually presumed to be of viral origin. Appropriate measures can then be taken for control.

A.L. Fletch, veterinary pathologist, has recently been invited to join the research team of Dr. J.W. Davidson of the Radiological Research Laboratories, on the project of "Lymphography of Animals." The purpose of the project is to develop animal models for the technique of lymphography commonly used in human medicine in certain cancer conditions.

HONOURS

L.R. CHRISTENSEN: President, Canadian Association for Laboratory Animal Science, 1969–70.

SCHOLARLY ADDRESSES

L.R. CHRISTENSEN: "Organization of the Work Force and Use of Labour Saving Devices in a Modern Animal Care Service," National Convention, Canadian Association for Laboratory Animal Science, September 1970; "Animal Facility Planning and Administration," Ontario Veterinary Association – Symposium on Laboratory Animals, November 1970; "Hazards of Unsuspected Disease in Laboratory Animals," Ontario Antibody Club, February 1971.

A.L. FLETCH: "Pneumococcus in Rats," National Convention, CALAS, September 1970; "Diseases of Primates," Ontario Veterinary Association – Symposium on Laboratory Animals, November 1970.

T.J. TAYLOR: "A Wide-spectrum Anthelminic in a Dog Conditioning Programme," National Convention, CALAS, September 1970; "Anaesthesia and Surgical Technique," Ontario Veterinary Association – Symposium on Laboratory Animals, November 1970.

PUBLICATIONS

TAYLOR, T.J. "On the Toxicity of Penicillin-Dihydrostreptomycin Preparations for Monkeys" (*CALAS Newsletter*, vol. 2, no. 5, 1970).

DIVISION OF STUDIES IN MEDICAL EDUCATION

Under the direction of Dr. A.I. Rothman

The main objective of the Division of Studies in Medical Education is to provide nurture to the Faculty of Medicine's instructional programme through the appro-

priate application of educational theory and technology. Operationally over the past year, this was achieved through the establishment of a broad and creditable service designed to bring the specialized knowledge of professionals in education within reach of the teaching faculty. As was suggested in last year's report, research activities were directed mainly in support of the Division's service function.

Service and Advisory Activity

During the past year, the Division's staff played an increasingly more active role relative to the instructional programme in all three periods of the curriculum and in the area of postgraduate medical education.

Staff members sat on all three period curriculum committees and served as advisors to the Periods I and II boards of examiners. In addition, Division personnel functioned as consultants in various capacities to many of the systems committees, to the Admissions Committee, to the Student Affairs Committee, and to the Dean's office. Members of the Division had extensive involvement with the Division of Post-Graduate Medical Education, Period I Gastrointestinal and Endocrinology systems committees, Period II Cardiovascular and Gastrointestinal systems committees, the new Department of Family and Community Medicine, and with the Anatomy 200 course offered in the Faculty of Arts and Science. The Division participated actively in the deliberation of the Cinader committee and a Division member is chairing the committee responsible for the production of the Period I experimental comprehensive examination.

Beyond this, Division members consulted with individual members of faculty on problems of research design and data processing.

Finally, the Division again administered a mock-up of the L.M.C.C. examination to final-year students at the University of Toronto, University of Western Ontario, Ottawa University, and Queen's University.

Curriculum Evaluation

Over the past year, with the active co-operation of the Medical Society and the teaching faculty, student evaluation questionnaires were administered at the end of all topics and systems in Periods I and II and at the end of Period III. Information from these questionnaires was returned to the appropriate faculty members and has had a marked effect on subsequent planning. During this time a standardized questionnaire form was developed and tried out in Period I. In addition, sampling procedures were developed that would lead to the generation of more representative information and would decrease the frequency with which students were asked to fill in questionnaires.

This procedure of soliciting student opinions has been widely accepted by faculty and has been institutionalized to the point where the Period I curriculum committee has suggested that class time be provided in each system or topic for the administration of the questionnaires.

Students' perceptions of the learning environment of the medical school have been measured using the Learning Environment Questionnaire developed by this Division, and the results circulated to the appropriate faculty members. This questionnaire has been adapted for similar use in several other medical teaching centres. The questionnaire has been expanded to include situations relevant to clinical teaching situations and is being trial-tested with this year's fourth-year students.

A progress report of the new undergraduate curriculum will be offered to faculty at a general meeting in October 1971. A member of this Division is chairing the planning committee charged with the responsibility of arranging the programme for this meeting.

Developmental Projects

This Division, along with Instructional Media Services, is establishing a pilot media resources centre in room 313 of the Anatomy Building to determine the feasibility of providing a facility where students may make use of self-instructional packages de-

signed to complement the existing educational programme. In doing this, the process of producing such materials will also be investigated. At present the centre consists of eight carrels, along with appropriate media hardware. The facility will be used this summer by the Division of Postgraduate Medical Education in support of their fellowship courses.

A project designed to contribute to the continuing education of family practitioners through the use of open broadcast television is in its preliminary stages. In this activity, this Division is co-operating with the Division of Postgraduate Medical Education and the Division of Instructional Media Services.

A project directed to the improvement of large-group lecturing is in the early stages of development. Teachers will be given the opportunity to see themselves lecturing through the medium of videotape recordings. They then will be guided through a rational self-evaluation of their own performance.

The Division is co-operating with the Division of Medical Computing in the development of a new test-scoring procedure. In addition, a new user's manual is being prepared which offers advice relating to the construction of effective test items, along with instructions pertaining to the use of the new system, and the interpretation of the information it generates.

RESEARCH

Psychological Testing Programme

The psychological testing programme has been operational since the fall of 1967. The objectives of this programme are: (1) to identify factors that relate to academic performance, clinical performance, career choice and, ultimately, performance as a professional; (2) to provide information useful in the context of curriculum monitoring and evaluation. The data of the first two years were used primarily on instrumentation research and development and also to evolve an effective study design.

Starting with the class that entered September 1970, we were able to use a stable battery of instruments in a study design involving periodic retesting of cohorts, which we felt would satisfy our objectives. The battery consists of tests of academic ability, personality, perceptions of learning environment, and career choice. This battery, with the exception of the test of academic ability, was readministered to the class that entered Period II in February 1971.

Over the past year, studies describing changes in perceptions of the learning environment and personality correlates of achievement have been completed and published. At present, studies describing the personality traits of first-year students over a four-year period and comparing the characteristics of persistent high and low achievers over a four-year period are in progress.

As an adjunct to this line of research, a test that will measure social commitment in a medical context is in its early stages of development.

Follow-Up Study of Medical School Graduates

A follow-up study of graduates was begun in the spring of 1966 based on a mailed questionnaire survey of the class of 1965. Since then, revised questionnaires have been given to the classes of 1966, 1967, and 1968. An expanded version of the questionnaire was administered in the spring of 1971. Items on the questionnaire relate to career choice and intentions, nature of advanced training, location and organization of practice, and professional involvements. Studies of factors affecting career choice and the stability of career choice are in progress.

Multi-Media Programming

As has been the case over the past two years, sections of the course in physiology for physical and occupational therapy students have been designed to make maximum use of the Medical Sciences Building's media facilities. Activity this year involved the

comparison of learning due to this mode of instruction with learning from a more traditional approach to instruction.

An adjunct to this programme has been the continued attempts to rationalize the use of a computer as an instructional tool.

Cross-Discipline, Cross-Cultural Studies of Perceptions of Learning Environments
At present, research involving the administration of a relevant Learning Environment Questionnaire to law students at Osgoode Hall, and translated into French for law students at the Université de Montréal is in its preliminary stages. This, the most remote activity of the Division, should permit both interesting and valuable comparisons to be made between disciplines and between cultures.

PUBLICATIONS

ROTHMAN, A.I. "Learning Environment of a Medical School: Expectations versus Perceptions of a First-Year Class" (*British Journal of Medical Education*, vol. 4, 1970, pp. 289–92).
ROTHMAN, A.I. and AYOADE, F. "Development of a Learning Environment: A Questionnaire for Use in Curriculum Evaluation" (*Journal of Medical Education*, vol. 45, 1970, pp. 754–9).
ROTHMAN, A.I. and FLOWERS, J.F. "Personality Correlates of First-Year Medical School Achievement" (*Journal of Medical Education*, vol. 45, 1970, pp. 901–5).

ANAESTHESIA

Under the direction of Professor R.A. Gordon

During this session, the departmental contribution to teaching in the undergraduate curriculum has expanded as Period II of that curriculum developed and the evolution of the clinical clerkship in the Department has continued to require particular attention in the teaching hospitals.

Methods of teaching and evaluation have come under critical scrutiny. A departmental study is going forward, directed to improvement of our methods of teaching of both undergraduate and postgraduate students and the development of more useful and trustworthy methods of evaluation.

There were 60 postgraduate students in the Department during the year, of whom 32 were registered for the Diploma in Anaesthesia, the remainder being sessional students. The Diploma in Anaesthesia of the University of Toronto was awarded to Dr. L. Bowers, Dr. D. Culver, Dr. D.W. Davies, Dr. D. McKee, Dr. O. Odugbesan, and Dr. J.D. Sinclair.

A Refresher Course in Anaesthesia for General Practitioners was given from March 8 to 12, 1971. It was attended by 32 physicians who provide anaesthesia in smaller communities in Ontario. Dr. A.J. Dunn was moderator for this successful course.

An International Symposium on Malignant Hyperthemia was held May 14 and 15, 1971 in conjunction with the Department of Pharmacology. The symposium was organized by Dr. Beverley Britt, who has made important contributions to the understanding of this reaction to anaesthesia. The participants included most of the investigators from around the world who have contributed to present knowledge of the syndrome.

The Twelfth Doctor Harry Shields Lecture was given on Friday, November 6, 1970 by Professor James Eckenhoff of Northwestern University Medical School. Professor Eckenhoff's subject was "The Physiological Significance of the Vertebral Venous Plexus."

A Lectureship in memory of Dr. Murray Mendelson has been established in the department through a benefaction from Mr. and Mrs. Irving Posluns, Mr. and Mrs. Jack Posluns, Mr. and Mrs. Wilfred Posluns, and Mr. and Mrs. Louis Posluns. The first Murray Mendelson Memorial Lecture was given on March 22, 1971 by Professor H.B. Fairley of the University of California Medical Center, San Francisco. Dr.

Fairley's topic was "Aspects of Intensive and Privative Care." The department is grateful to the donors for this memorial.

Professor Gordon MacDowell of the University of Leeds lectured on December 21, 1970 on "Changes in Intracranial Pressure during General Anaesthesia." Dr. J.B. Forrest was guest lecturer on March 19, 1971, his subject being "Structural Alterations in the Alveolus following Hyperventilation."

Professor Lucien Morris left the department on December 31, 1970, assuming an appointment as Chairman of the Department of Anesthesia at the Medical School of Ohio at Toledo. Dr. A.J. Dunn was appointed Associate Professor and Anaesthetist-in-Chief, St. Michael's Hospital. Dr. J.M.R. Campbell was appointed Associate Professor and Anaesthetist-in-Chief, Toronto Western Hospital. Dr. Campbell succeeds Dr. H.W. Boyes, who retired because of ill-health. Dr. Boyes provided effective leadership to the department in the Toronto Western Hospital over a period of seven years, and we wish at this time to recognize his considerable contribution in this role. Professor A.W. Conn will relinquish his appointment as Anaesthetist-in-Chief at the Hospital for Sick Children at the end of the current academic session, to be succeeded by Dr. David Steward. Dr. Conn remains in the department and assumes the responsibilities of Director of Intensive Care, Hospital for Sick Children.

Dr. James Duffin was appointed Assistant Professor in the department; Dr. E. Michel, Dr. George Gale, Dr. Wm. Millman, Dr. B.R. Puddy, and Dr. N.O. Jones have been appointed Clinical Teachers at Toronto General Hospital; Dr. Wm. Noble and Dr. Wm. Stoyka at St. Michael's Hospital; Dr. Malcolm Stoby at Toronto Western Hospital; Dr. David Cole and Dr. Derek Shilletto at Wellesley Hospital.

Dr. D.J. Armstrong, Dr. E. Balkissoon, Dr. D. McCuaig, Dr. Ruraidh McIntyre, Dr. Wm. Millman, Dr. David Openshaw, and Dr. D.D. Imrie have resigned from the department to take up appointments elsewhere.

Professor R.A. Gordon was Vice-President of the World Federation of Societies of Anaesthesiologists and Co-Chairman of the Anaesthesia Training Foundation of that body. Professor Gordon attended meetings of these bodies held in conjunction with the Third European Congress of Anaesthesiologists in Prague in August 1970.

Professor Alan Noble was Visiting Professor at McGill University from March 30 to April 5, 1971.

RESEARCH

Professor A.C. Bryan has studied the effects on gas exchange of tracheobronchitis in children and changes following tracheostomy; effects of fluid loading on lung function; fluid balance during artificial ventilation; methods of artificial ventilation which might prove to be less damaging to lung tissue than methods currently and traditionally in use; and intracranial pressures monitoring in head injuries with a view to early detection of cerebral edema and its projected treatment with hyperbaric oxygen.

In collaboration with Professor Kalow of the Department of Pharmacology, Dr. Beverley Britt has continued her studies of malignant hyperthermia associated with anaesthesia in human survivors and in affected strains of Poland China pigs. She has demonstrated in the rigid form of this syndrome in the human that the inherited defect is a decrease in the ability of the membrane of the sarcoplasmic reticulum of the muscle cell to retain calcium when exposed to anaesthetic agents, and that this may be prevented or reversed by procaine. Dr. Britt has also demonstrated by the study of afflicted families that in normal health, the affected individuals have an abnormally high level of creatine phosphykinase (CPK) in the plasma, and that this may be used as a marker to identify such individuals.

Dr. John Brebner, working in Professor Kalow's laboratory in the Department of Pharmacology has continued his studies of the soluble esterases of human tissues, particularly characterization of soluble esterases of human foetal lung and liver, by starch gel electrophoresis. Dr. Brebner has also developed a gas chromatographic technique to measure hydrolysis of meperidine and aspirin by soluble esterases of lung

and liver, and has studied the inhibition of serum cholinesterases by pancuronium bromide.

Dr. James Duffin has designed and constructed instrumentation preparatory to embarking on studies of the effects of anaesthetics on ventilation responses mediated by the peripheral chemoreceptors and on the medullary regulation of respiration. He has also designed and constructed an inexpensive thermistor temperature monitor for clinical use.

Toronto General Hospital

Dr. A.K. Laws is investigating the pathophysiology and early detection of pulmonary edema and has continued his studies of aspects of the physiology of intermittent positive pressure ventilation with special reference to the distribution of pleural pressure.

Dr. Samuel Galloon has continued his studies of ketamine anaesthesia and has initiated a study of the efficacy of current methods of pain relief in labour.

Dr. Ramon Evans has continued his studies on the management of intractable pain, supported by the Irene Eleanor Smythe Fund. Continuation of the study of acid/base status of patients with intractable pain due to organic lesions confirms the occurrence of metabolic alkalosis in these patients, which was previously reported, although the reason remains obscure.

Dr. John Desmond has measured blood loss in patients undergoing transurethral resection of the prostate and has related this to anaesthetic factors and weight of gland resected. Dr. Desmond has also studied the effect of hyperventilation on the mother and child during Caesarean Section, and has assessed the pre-operative blood volume status of quadriplegic patients.

Dr. B.M. Marshall, with the assistance of Dr. E. Michel, has initiated a study of factors involved in anaesthesia for carotid artery bypass procedures.

Dr. Arthur Scott is investigating the effects of arterial cannulation.

Dr. Sallie Teasdale has continued an investigation of water and electrolyte balance before and after cardiopulmonary bypass and, with Dr. D. MacGregor of the Department of Surgery, the investigation of the haemodynamic effect of Bretylium. With Dr. W. Mahon of the Department of Pharmacology, Dr. Teasdale has studied digoxin levels in blood and urine excretion of digoxin before and after cardiopulmonary bypass and, with Dr. B.S. Goldman of the Department of Surgery, the effect of whole blood prime versus dilution on the immune response of patients undergoing open-heart surgery.

St. Michael's Hospital

Studies have been continued in dogs to determine the effect of anaesthetic agents on cardiac output in various circumstances. These studies were initiated under the direction of Professor Lucien Morris. Dr. Edith Simandl and Dr. D.C. Lee have studied the effect of propanolol on cardiovascular response to carbon dioxide during cyclopropane anaesthesia. Dr. Lee has completed a study of the effect of atropine upon cardiac output. Dr. Stoyka and Dr. Lee have completed studies of the effect on cardiac output of acid-base changes during anaesthesia with fluroxene and methoxyflurane. Dr. Lee is studying these relationships during chloroform anaesthesia.

Dr. W.H. Noble has developed a new indicator dilution technique to quantitate pulmonary edema, and is studying the effects of the clamping of the hilum of one lung on the production of pulmonary edema in the dog. In association with Dr. G. Gray of the Defence Research Establishment at Downsview, Dr. Noble has initiated a study on the effect of high altitude on pulmonary edema in the dog; in association with Mr. Colin Kay a study of indocyanine green dye calibration curves and the effect of alinearity on cardiac output determinations. Dr. Hanna Samulska and Dr. S. Ramaiah, under the direction of Dr. Noble, have completed a study of unintentional exposure of surgical patients to halothane caused by washout of halothane from rubber anaesthetic equipment. Dr. R.W. McIntyre has evaluated the function of ventilators in common use, using a lung model, and has made an initial assessment of a newly designed ventilator.

Toronto Western Hospital
Dr. David Evans has continued his studies of the effect of veno-arterial bypass on cardiopulmonary haemodynamics in the dog. Dr. Wm. Jones and Dr. Michael Krestow have studied the use of ketamine as an induction agent in anaesthesia.

Hospital for Sick Children
Dr. H.I.A. Nisbet, with Dr. D.A. Pelton, Dr. J.E.S. Relton, Dr. R.E. Creighton, and Dr H. Levison, has conducted studies of respiratory mechanics in anaesthetized children; of respiratory mechanics and Va/Q changes in anaesthetized ventilated dogs and the response of dogs under anaesthesia to severe arterial hypoxaemia The effect of low concentrations of methoxyflurane in air on cerebral blood flow in dogs has been evaluated. A scoring system for objective measurement of pre-operative sedation in children has been studied. Studies continue on the accurate measurement of pH and on haemodilution effect during and after cardiopulmonary bypass in children.

Dr. I.A.J. Sloan has continued his studies in problems of hypoxia.

Dr. A.E. Johnston has studied electrolyte balance in children, using acid citrate blood prime, with particular interest in potassium, ionized calcium, and magnesium balance.

Dr. R.E. Creighton has continued his work on cerebral circulation. With Dr. H. Meridy, he has reviewed anaesthetic technique in familial dysautonomia, and with Dr. Brian Green has investigated the effect of simple humidification on vapour concentrations delivered by anaesthetic vaporizers.

Dr. D.J. Steward, with Dr. Beverley Britt and Professor W. Kalow of the Department of Pharmacology, has investigated the effects of halothane on calcium uptake into isolated sarcoplasmic reticulum prepared from human and porcine muscle.

Dr. J.S. Whalen has continued a study of the use of ketamine hydrochloride, especially in children with airway obstruction and integumentary problems.

New Mount Sinai Hospital
Dr. Gerald Edelist and the staff of the New Mount Sinai Hospital are evaluating the use of ketamine anaesthesia in various surgical procedures, and especially as an induction agent, and are conducting a comparative study of postoperative pulmonary complications following cholecystectomy under epidural anaesthesia and nitrous oxide/narcotic/relaxant anaesthesia.

Women's College Hospital
Dr. Patricia Goodhall, with Dr. John Milligan of the Department of Obstetrics and Gynaecology, has studied the effect of halothane in oxygen and in air on the breathing patterns of anoxic newborn rabbits.

HONOURS

Dr. Alan Noble was awarded the Canadian Anaesthetists' Society Medal for Meritorious Service in Anaesthesia, June 1971.

Dr. I.M. MacKay was appointed Honorary Physician to Her Majesty the Queen (Q.H.P.).

Dr. Wm. Noble was awarded the Canadian Anaesthetists' Society Prize for the best original paper based on work done in Canada and published in the Canadian Anaesthetists' Society Journal during 1970.

SCHOLARLY ADDRESSES

Dr. John Brebner, "Prenatal Development of Human Lung and Liver Esterases," to the Canadian Federation of Biological Sciences, June 18, 1971.

Dr. Beverley A. Britt, "Malignant Hyperthermia – An Investigation of Three Patients," to the Royal College of Surgeons of England, London, September 18, 1970; "Malignant Hyperthermia – A Review," to the Department of Anaesthesia,

McGill University, Montreal, March 1, 1971; "Malignant Hyperthermia and the Mitochondrion in Human Patients" and "Prevention of Malignant Hyperthermia," to the International Symposium on Malignant Hyperthermia, Toronto, May 14 and 15, 1971; "Malignant Hyperthermia – An Introduction," to the Pierre Marquette School of Medicine, Milwaukee, Wis., USA, June 1, 1971.

Dr. A.C. Bryan, "Flow Regimes within the Lung," to the Departments of Medicine and Physiology, McGill University, Montreal; "Effect of Acceleration on the Lung" and "Effect of Acceleration on the Cardiovascular System," to the Department of Physiology, State University of New York at Buffalo.

Dr. Alan W. Conn, "Anaesthetic Management of the Neonate," to the St. Luke's and Texas Children's Hospital, Houston, Texas; "Paediatric Anaesthesia," to the Atlantic Regional Meeting, Canadian Anaesthetists' Society, Halifax, N.S.; "Anaesthetic Management of the Neonate," to the Ohio Society of Anaesthesiology, Cleveland, Ohio; "Paediatric Respiratory Failure," to the Loma Linda University, Loma Linda, California; "Anaesthetists' role in reducing Morbidity and Mortality," "Electrical Hazards in the Operating Room," "Treatment of Cardiac Arrhythmias," and "Use of Ketamine in Paediatric Anaesthesia," to the 9th Clinical Conference in Paediatric Anaesthesia, Children's Hospital, Los Angeles, California; "Anaesthetic Problems in Paediatric Orthopaedics," to the 4th Annual Anaesthesia/Orthopaedics Seminar, Mount Sinai School of Medicine, City University of New York, New York; "Recent Advances in Paediatric Anaesthesia," to the Springfield Hospital, Springfield, Mass.; "Status Asthmaticus and Bronchiolitis," to the Annual Paediatric Postgraduate course, Woodruff Medical Centre of Emory University, Atlanta, Georgia; "Recent Advances in Paediatric Anaesthesia," Hartford Hospital, Hartford, Conn.

Dr. R.E. Creighton, "Experimental Congenital Diaphragmatic Hernia," to the Canadian Federation of Biological Societies.

Dr. D.W. Davies, "The Effects of Positive Pressure Expiratory Plateau while Ventilating with the Bird Ventilator Mk 7 or Mk 8," to the Annual Meeting, Canadian Anaesthetists' Society, Quebec, June 1971.

Dr. Gerald Edelist, "Aspiration Pneumonia," to the Manitoba Medical Society, May 4, 1971.

Dr. R.J. Evans, "Intractable Pain associated with Malignancy," to the Royal College of Physicians and Surgeons of Canada, Ottawa, January 1971.

Dr. S. Galloon, "A Study of the Use of Ketamine," to the Department of Anaesthesia, Welsh National School of Medicine, Cardiff, Wales, and Department of Anaesthesia, University of Cape Town, South Africa; "The Anaesthetist and the Electrocardiogram," to the New York State Society of Anesthesiologists, Syracuse, New York.

Dr. R.A. Gordon, "History of Malignant Hyperthermia," to the International Symposium on Malignant Hyperthermia, Toronto, May 1971.

Dr. Brian J. Green, "Effect of Humidification on the Concentration of Halothane and Methoxyflurane delivered by Vapourizers," to the Annual Meeting, Canadian Anaesthetists' Society, Quebec, June 1971.

Dr. A.K. Laws, "Effect of Fluid Overload on Lung Function," to the Symposium on Pulmonary Water, Montreal General Hospital and McGill University, February 1971; "Some Aspects of Pulmonary Physiology with Special Reference to Chest Physiotherapy," to the Canadian Association of Physiotherapists, March 1971; "Effects of Acute Circulatory Overload on Pulmonary Function," to the Canadian Tuberculosis and Respiratory Disease Association and Canadian Thoracic Society, June 1971.

Dr. Dochil Lee, "Propanolol and the Cardiovascular Response to Carbon Dioxide during Cyclopropane Anaesthesia in Dogs," to the Federation of Societies of Biological Sciences, Chicago, April 1971.

Dr. H.I.A. Nisbet, "Thoracic Elastance and its Components in Normal and Scoliotic Children," to the Scoliosis Research Society, Toronto, September 1970; "Cerebral Blood Flow in Hypoxaemic Anaesthetized Dogs," to the 45th Congress of the International Anaesthesia Research Society, Miami, Florida, March 1971, and

the Department of Anaesthetics, Leeds University, Leeds, England, May 1971, and the Scandinavian Society of Anaesthetists' Congress, Lund, Sweden, June 1971; "Cardio-respiratory Responses to Severe Hypoxaemia in Anaesthetized Dogs" and "Biochemical Effects of Hemodilution Technique using A.C.D. Blood Prime in Paediatric Patients," to the Annual Meeting, Canadian Anaesthetists' Society, Quebec, June 1971.

Dr. J.E.S. Relton, "Malignant Hyperthermia – Clinical Aspects," to the Symposium on Metabolic Effects of Anaesthesia, Royal College of Surgeons of England, September 1970, and the International Symposium on Malignant Hyperthermia, Toronto, May 1971, and the G.S. Ambardekar Anaesthesia Society, Bombay, India, and the King George Medical College, Lucknow, India, and the G.B. Pant Hospital, New Delhi, India, and the Department of Anaesthesia, University of Calcutta, India; "Spinal Fusion and Harrington Rod Instrumentation," to the King George Medical College, Lucknow, India, and the G.B. Pant Hospital, New Delhi, India, and the G.S. Ambardekar Anaesthesia Society, Bombay, India.

Dr. A.A. Scott, "Accidental Hypothermia in Anaesthesia – Drug Overdosage," to the Ontario Medical Association, Section of Anaesthesia, Thunder Bay, September 1970; "Transportation of the Acutely Ill or Injured Patient," to the Annual Meeting, Ontario Medical Association, May 12, 1971.

Dr. I.A.J. Sloan, "Arrhythmias in Paediatric Anaesthesia," to the Section of Anaesthesia, Ontario Medical Association, Thunder Bay, September 1970; "Paediatric Anaesthesia for Abdominal Surgery," and "Ventilation Problems in Children," to the Cleveland Clinic Educational Foundation, Cleveland, Ohio, USA.

Dr. D.J. Steward, "Management of Body Temperature during Surgery," to the Section of Anaesthesia, Ontario Medical Association, Thunder Bay, September 1970; "The Anaesthetist and the Neonatal Respiratory System" and "Malignant Hyperpyrexia – Clinical and Biochemical Aspects," to the Cleveland Society of Anaesthesiologists, February 1971; "Intracellular Calcium Metabolism in Malignant Hyperpyrexia," to the International Symposium on Malignant Hyperthermia, Toronto, May 1971.

Dr. J.S. Whalen, "Application of Ketamine Hydrochloride in the Management of Burn Surgery," to the Academy of Medicine, Toronto.

PUBLICATIONS

Brebner, J. and Kalow, W. "Soluble Esterases of Human Lung" (*Canadian Journal of Biochemistry*, vol. 48, 1970, pp. 970–8).

Britt, B.A. and Kalow, W. "Malignant Hyperthermia: A Statistical Review" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 293–315).

——— "Malignant Hyperthermia: Aetiology Unknown!" (*ibid.*, pp. 316–30).

Britt, B.A. and Kalow, W. (with Terreau, M.E. and Haist, C.) "Metabolic Error of Muscle Metabolism after Recovery from Malignant Hyperthermia" (*Lancet*, vol. 2, October 31, 1970, p. 895).

Britt, B.A. (with Beldase, J., Small, V. and Cooper, D.A.) "Postoperative Malignant Hyperthermia: A Case Report" (*Canadian Anaesthetists' Society Journal*, vol. 18, 1971, pp. 202–12).

Bryan, A.C. (with Frayser, R., Gray, G.W., Houston, C.S. and Rennie, I.D.B.) "Control of Acute Mountain Sickness" (*Aerospace Medicine*, vol. 42, 1971, p. 81).

——— "The Response of the Retinal Circulation to Exposure to Altitude" (*Physiologist*, vol. 13, 1970, p. 198).

——— "The Response of the Retinal Circulation to Altitude" (*Archives of Internal Medicine*, vol. 127, 1971, p. 708).

Bryan, A.C. (with Frayser, R., Houston, C.S., Rennie, I.D.B. and Gray, G.W.) "Retinal Hemorrhage at High Altitude" (*New England Journal of Medicine*, vol. 282, 1970, pp. 1183–4).

Bryan, A.C., Nisbet, H.I.A., Weng, T.R. and Levison, H. "The Effect of Rapid Oscillatory Flow on the Anatomical Dead Space" (*Clinical Research*, vol. 18, 1970, p. 741) (abstract).

Bryan, A.C. and Wood, L. "Respiratory Sensitivity to CO_2 at Increased Ambient Pressure" (*Physiologist*, vol. 13, 1970, p. 348).

Desmond, J.W. "Paraplegia: Problems confronting the Anaesthesiologist" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 435–51).

DESMOND, J. and GORDON, R.A. "Ventilation in Patients anaesthetized for Laparoscopy" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 378–87).
DESMOND, J. and TAYLOR, K.W. "Electrical Hazards in the Operating Room with special reference to Electrosurgery" (*Canadian Journal of Surgery*, vol. 13, 1970, pp. 362–74).
DUFFIN, J. "The Chemical Regulation of Ventilation" (*Anaesthesia*, vol. 26, 1971, pp. 142–54).
EDELIST, G. "Effect of Hypothermia on the Respiratory Response to Carbon Dioxide" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 551–6).
——— "Malignant Hyperthermia – an Ounce of Prevention" (*Anesthesiology*, vol. 34, 1971, pp. 387–9).
EVANS, D. "A Note on the Surgical Anatomy of the Omocervical Artery in Dogs" (*Canadian Anaesthetists' Society Journal*, vol. 18, 1971, pp. 230–1).
EVANS, R.J. "Acid-base Changes associated with Intractable Pain and Malignancy" (*Annals, Royal College of Physicians and Surgeons of Canada*, vol. 4, 1971, p. 22) (abstract).
FLEMING, S.A. "Anaesthesia"; in *Tropical Surgery*, ed. Seymour J. Schwartz, A.O. Adesola, E. A. Elebute and C. G. Robb, pp. 48–65. New York: McGraw-Hill, 1971.
GALLOON, S. and HILLIARD, E.K., "A System for Arterial and Venous Pressure Calibration and Recording" (*British Journal of Anaesthesia*, vol. 42, 1970, pp. 469–70).
GEBBIE, D.M. "Colistimethate and Curare: A Case Report" (*Anaesthesia and Analgesia*, vol. 50, 1971, p. 109).
GORDON, R.A. "On the Practice of Anaesthesia in Canada" (*British Journal of Anaesthesia*, vol. 42, 1970, pp. 792–4).
LEE, D. and JOHNSON, D.L. "Effect of D-tubocurarine and Anaesthesia upon Cardiac Output in Normal and Histamine Depleted Dogs" (*Canadian Anaesthetists' Society Journal*, vol. 18, 1971, pp. 157–65).
NISBET, H.I.A., LAMARRE, A., LEVISON, H., HALL, J.E. and RELTON, J.E.S. "Thoracic Elastence and its Components in Normal and Scoliotic Children" (*Journal of Bone and Joint Surgery*, vol. 53, 1971, p. 199).
NISBET, H.I.A., LEVISON, H. and PELTON, D.A. "Static Thoracic Compliance in Normal Children under General Anaesthesia" (*Acta Anaesthesiologica Scandinavica*, vol. 15, 1971, p. 179).
——— "Thoracic Wall Compliance in Children" (*ibid.*, p. 286).
NISBET, H.I.A., PELTON, D.A., RELTON, J.E.S. and LEVISON, H. "The Effect of D-tubocurarine upon the Static Elastic Recoil of the Thorax" (*Canadian Anaesthetists' Society Journal*, vol. 18, 1971, pp. 304–9).
NOBLE, A.B. and MURRAY, J.G. "A Review of the Complications of Spinal Anaesthesia with Experiences in Canadian Teaching Hospitals from 1959 to 1969" (*Canadian Anaesthetists' Society Journal*, vol. 18, 1971, pp. 5–17).
NOBLE, W.H. (with Kronenberg, R., Safar, P., Lee, J., Wright, F., Wahrenbrock, E., Hickey, R., Nemoto, E. and Severinghaus, J.W.) "Pulmonary Artery Pressure and Alveolar Gas Exchange in Man during Acclimatization to Altitude" (*Journal of Clinical Investigation*, vol. 50, 1971, p. 827).
RELTON, J.E.S. "Malignant Hyperpyrexia—Clinical Aspects"(*Annals of the Royal College of Surgeons of England*, vol. 48, 1971, p. 72).
ROBERTS, H. and BOYAGIAN, K. "Electrocardiographic Changes associated with the Use of Epinephrine during General Anaesthesia" (*Canadian Anaesthetists' Society Journal*, vol. 18, 1970, pp. 591–6).
SCOTT, A.A. (with Brown, C.S.) "Cardiopulmonary Resuscitation: A Review of 184 Cases and some Applications for Future Improvements" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 565–73).
SIMANDL, E., LEE, D.C. and MORRIS, L.E. "Propanalol and the Cardiovascular Response to Carbon Dioxide during Cyclopropane in Dogs" (*Federation Proceedings*, vol. 30, 1971, p. 1376).
STEWARD, D.J. "Congenital Abnormalities as a Possible Factor in the Aetiology of Post-Intubation Subglottic Stenosis" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 388–90).
TEASDALE, S.J., GOLDMAN, B.S., TRIMBLE, A.S., SHEVERINI, M.A., SILVER, M.D. and ELLIOTT, G. "Functional and Metabolic Effects of Anoxic Cardiac Arrest" (*Annals of Thoracic Surgery*, vol. 11, 1971, pp. 122–32).

ANATOMY

Under the direction of Professor J.S. Thompson

TEACHING

The academic year 1970–71 was one of consolidation. We were teaching for the second year in our new quarters and for the second year of the new curriculum. Hence

the year was one of small adjustments and improvements. One exception to this was the commencement of a programme in the use of colour television in the teaching of gross anatomy. In October the equipment was finally installed and several tapes were made which, by and large, were well accepted by the classes which used them. This medium is well suited to the demonstration of many structures and principals in gross anatomy and various members of the Department of Anatomy are learning to use it.

The elective programme in Anatomy again this year attracted a respectable number of students. Fifteen took the programme voluntarily, while four were required to take a remedial elective to improve their knowledge of basic anatomy.

Again this year Residents in various specialties, especially Orthopaedics, Obstetrics and Gynaecology, and Otolaryngology, became full time demonstrators in the Gross Anatomy laboratories while the students were studying areas of particular concern to them. These Residents performed a very valuable service and, in return, received training in areas of Anatomy they must understand in order to pursue their specialties successfully. They also brought to our students knowledge of the clinical importance of the areas being considered.

Members of the Department of Radiology, at intervals throughout the year, came to the department to conduct small group teaching in the basic elements of radiological anatomy, thereby bringing to the medical students the benefit of their clinical experience in this specialty.

Some graduate trainees in Dentistry and practising Dentists joined the laboratories for dental students, and members of the staff of the Division of Rehabilitation Medicine brought their special knowledge to the laboratories for students in Rehabilitation Medicine.

UNDERGRADUATE TEACHING

In some courses, as noted, graduate students join the medical courses.

Gross Anatomy

60	Anatomy 200 (Arts)
125	Dentistry (1st year)
2	joined by special students
51	Dental Hygienists
206	Medical Students (1st year)
5	joined by Art as Applied to Medicine
3	joined by Graduate and Special Students
109	Rehabilitation Medicine (1st year)
97	Rehabilitation Medicine (2nd year)
16	Speech Pathology and Audiology
99	Physical and Health Education (1st year)
78	joined by Nurses (1st year School of Nursing)
97	Physical and Health Education (2nd year)

Histology

206	Medical Students (1st year)
5	joined by Art as Applied to Medicine
13	joined by Graduate and Special Students
109	Rehabilitation Medicine (2nd year)

Neuroanatomy

206	Medical Students (1st year)
10	joined by Art as Applied to Medicine
32	joined by special B & M group
16	Speech Pathology and Audiology
1,545	*Total in Undergraduate Courses*

GRADUATE TRAINING

Members of the Department supervised graduate students proceeding towards graduate degrees in this Department and conducted courses taken by graduate students in this and other departments.

In the past year students completed graduate programmes and have graduated or will graduate this spring with the degrees noted:

3 Completed Ph.D.
2 Completed M.Sc.

Students presently registered in this Department (exclusive of those awarded graduate degrees this year):

4 Ph.D.
4 M.Sc.
1 Postdoctoral

Formal Graduate Courses

24 Growth, Constitution and Evolution
10 Neuroanatomy
34 *Total in Graduate Courses*

POSTGRADUATE TRAINING

Many graduates in the Health Sciences return to take further training in various specialties. The Department of Anatomy offers many courses specifically designed for such individuals, many of whom are proceeding to certification or fellowship in the Royal College of Physicians and Surgeons of Canada.

Postgraduate Teaching

25 Graduate Physical and Occupational Therapy Refresher Course
20 Graduate Dental Students
20 Postgraduate Diagnostic Radiology
20 Postgraduate Anaesthesia
9 Postgraduate Ophthalmology
10 Postgraduate Otolaryngology
10 Postgraduate Obstetrics
35 Advanced Course in Surgery
17 Advanced Course in Obstetrics and Gynaecology
166 *Total in Postgraduate Courses*

In addition to the above named formal courses, the staff supervised the training in Anatomy of many postgraduate students who are training in various specialties in the different hospitals in Toronto. These students dissected the portions of the body appropriate to their specialties and instructed medical students on these same areas.

6 Orthopaedics
2 Obstetrics and Gynaecology
6 Otolaryngology

In addition to the foregoing, the facilities of the Department were made available to those whose work required detailed knowledge of certain small areas of the body and who wished to spend a few hours in the Department making investigations in specific areas.

The Department was happy to co-operate with the Department of Otolaryngology in providing space and materials for the section on Anatomy for the intensive course in Rhinoplasty. Dr. R.G. MacKenzie of this Department was a member of the Faculty for this course.

STAFF

It is with regret that we report the resignation of Associate Professor G.F. Lewis who first joined the Department of Anatomy in 1947. Professor Lewis leaves to join the staff of McMaster University in Hamilton.

Assistant Professor A.C. Strickler, who for many years has taken time from his practice to serve part time in this Department, has resigned to devote full time to his practice.

RESEARCH

Dr. A. Axelrad and his associates have continued their investigations into the genetic control of susceptibility and resistance to murine leukaemia viruses. Tests on the two pairs of congenic strains of mice which were produced by selection for susceptibility and resistance to Friend Leukemia Virus *in vivo* have shown that these strains differ at two different gene loci. With Miss M. Ware, it has been found that one of these loci operates *in vitro* as well as *in vivo*. Each of two alleles at this locus controls cellular resistance which is dominant, relative, and specific for one class of murine leukaemia viruses, while conferring susceptibility to the other class, in reciprocal fashion. Preliminary evidence indicates that the response not only to exogenously administered leukaemia viruses but also to leukaemia viruses normally carried by these mice is strongly influenced by this gene locus.

With Mr. John Stephenson and in collaboration with Dr. D.L. McLeod, studies on hemopoietic differentiation have been carried out. It has been found possible to show by physical means that the erythropoietin sensitive cells are a class of cells distinct from pluripotent hemopoietic stem cells. Erythropoietin-dependent colonies of haemoglobin-synthesizing cells have been produced in semi-solid plasma culture from mouse foetal liver and adult bone marrow cells.

Dr. E.G. Bertram's research is in two areas: (1) A continuation, by the use of Golgi silver staining, of a morphological study of the recurrent collaterals from axons of cortical neurons in cat and man. The recurrent collaterals course back and synapse on cell bodies or dendrites of neurons in the upper layers of cortex. Some of the recurrent collaterals are even seen to synapse on the dendrites of some neurons. (2) An extensive investigation of the capillary-neuronal relationship continues in this laboratory. The relationship of neurons to blood vessels in the cortex as well as basal ganglia, diencephalon, and brain stem is being studied by the use of modified Golgi technique, basic aniline dye, and eventually electron microscopic studies.

Dr. W. Brown is investigating the effects of Friend Erythroleukemia Virus on numbers of megakaryocytes and platelets in mice. Her observations support the concept that platelet decline in infected animals is due, at least in part, to an earlier decline in the number of megakaryocytes that occurs following the leukemia virus infection. Unit gravity sedimentation of bone marrow suspensions, together with microspectrophotometric evaluation of nuclear DNA content of these cells, showed that the FV-induced fall in the number of megakaryocytes was due mainly to an effect on megakaryocytes with the highest nuclear DNA content, while cells of lower DNA content were less affected. Expeirments are now in progress to determine whether megakaryocytes have been impaired as a result of infection in such a way that DNA doubling becomes increasingly more difficult with progressive maturation, or whether the host eliminates the more mature infected cells.

Dr. D.H. Cormack has investigated the anti-tumour action of the basic polymer polylysine. Working with Mr. F. Fifield, he showed that homopolymers of lysine caused cytolysis of polyoma virus-induced tumour cells, and completely inhibited the proliferation of the remaining cells. Both effects were dependent on the degree of polymerization of the polymer, and probably resulted from a structural change in the cell membrane, with the proportion of cells critically damaged depending on the concentration of polylysine applied. The anti-tumour action of this basic polymer was not reversed by subsequent treatment of the cells with an anionic polymer, dextran sulfate, at non-toxic concentration. The anti-tumour effect of polylysine was therefore shown to be due to its ability to damage the cell membrane of the tumour cell.

Dr. J.W.A. Duckworth continued his research in two areas of embryology: (1) the embryological origin of disorders of the bulboventricular region of the human heart, with reference to the congenital abnormalities that arise in this portion of the heart; (2) the development and fate of the ultimobranchial bodies in the human embryo, supervising the research of Mr. Bruce Fraser who was proceeding to the M.Sc. degree.

Dr. A.G. Erwin has commenced a study on improving methods of audiovisual presentations for various areas of gross anatomy.

Dr. V.I. Kalnins is conducting research in two areas: (1) Studies of morphological and biochemical aspects of centriole replication during ciliogenesis have been continued. Evidence was obtained that fibrogranular material found in association with the basal ends of the recently mature centrioles in rat trachea represent a stage in rootlet formation and not a stage in the assembly of new procentrioles. It was found that *in vitro* but not *in vivo* dense "centriole organizing" material accumulates around the two diplosomal centrioles prior to ciliogenesis. Experiments with vinblastine (which prevents the assembly of microtubules) showed that at certain doses this drug interferes with the assembly of centrioles but not with the formation of "centriole organizers." (2) With H.J. Weinroth, FV-infected and uninfected spleens of congenic strains of mice, which differ at single gene loci that control histocompatibility and susceptibility to FV, have been compared. The number of typical murine leukaemia viruses observed by electronmicroscopy in infected spleens correlated well, both with the degree of susceptibility of these strains to FV and with the amount of infectious virus that could be recovered from the spleens of these mice. In mice not deliberately infected, typical murine leukaemia viruses were observed in the susceptible but not in the resistant number of a congenic strain pair that differed at a single gene locus controlling the response to FV *in vivo*.

Dr. B. Liebgott is currently undertaking a study to determine the manner in which certain craniofacial characteristics are transmitted from parent to child. He is also continuing his investigation of the physical growth and development of children afflicted with congenital facial dysplasias. During the past year he completed his factor analysis of serial cephalometric measurements of boys at ages 3 to 16 years and was awarded the degree of Doctor of Philosophy for his work in this field.

Dr. D.L. McLeod and his co-workers have, during the past year, concentrated largely on studies on the differentiation of hemopoietic cells.

In collaboration with Dr. Axelrad's group they have been able to modify the plasma culture system which was developed in this laboratory and produce colonies of both granulocytic (peroxidase-positive) cells and erythroid (haemoglobin-synthesizing) cells from foetal mouse liver cells. The growth of granulocytic colonies was dependent on a growth factor present in conditioned medium while the erythyroid colonies were erythropoietin-dependent. A method by which both types of colonies can be stained, identified, and counted *in situ* has also been developed. Erythyroid colonies have been produced from single cell suspensions of adult mouse bone marrow cells in this system as well, but the colonies so far have been smaller and more difficult to count than those produced from foetal liver cells. They have also shown that the erythropoietin-sensitive cell and the cell which produces erythroid colonies *in vitro* have the same sedimentation velocity by unit gravity sedimentation, and that they can be separated physically from the pluripotent colony forming cells of hemopoietic tissues.

Work is continuing in these fields and they are now attempting to apply the plasma culture system to the study of haemopoietic cell differentiation in human tissues.

Dr. C.G. Smith and Dr. Freda Richardson collaborated in a study of the anterior cerebral artery to learn the incidence and distribution of arteries that supply both cerebral hemispheres. A study of 71 human brains revealed that 12, that is 17 per cent, had such arteries and that 7 of these arteries supplied the motor cortex (lower limb portion) of both hemispheres. Thus an occlusion of one anterior cerebral artery could result in paralysis of both lower limbs in 10 per cent of all such vascular lesions.

Dr. J.S. Thompson, with Dr. A. Roberts, is continuing to study the effect of the genotype on the susceptibility of mice to atheromata produced by diet. Using male mice of CBA/J (resistant) and C57BR/cdJ (susceptible) strains and F_1 F_2 and first Backcross generations, they are endeavouring to establish the importance of genotype on susceptibility to the formation of lesions and also to determine the nature of the

genetic control. The studies include examination of frozen sections that have been stained for fat and determination of cholesterol levels in the serum.

HONOURS

Dr. E. G. Bertram was a Canadian Delegate to the International Congress of Anatomists in Leningrad, August 1970.

SCHOLARLY ADDRESSES

A.A. Axelrad, "Relative Sensitivities of sim and sim.r. Congenic Mice and their Cells to Infection by Strains of Friend Leukemia Virus that differ in Host Range," at the Symposium on Genetic Factors in the Friend Virus Disease Syndrome, National Cancer Institute, Bethesda, Md., 1971; "Host Cell Susceptibility and Resistance to Murine Leukemia Viruses and their Genetic Control," at the Symposium on rna Viruses and Host Genome in Oncogenesis, Amsterdam, 1971.

W. Brown, "Reduction in the number of Bone Marrow Megakaryocytes in Mice following Infection with Friend Erythroleukemia Virus (fv), to the Canadian Federation of Biological Sciences, University of Montreal, P.Q.

J.W.A. Duckworth, "Howard Blackburn, the Iron Man," to the Toronto Medical Historical Society in February 1971.

V.I. Kalnins, "Centriole Replication during Ciliogenesis in the Chick Trachea," to the Section of Cell Biology, M.D. Anderson Hospital and Tumor Institute, University of Texas, July 6, 1970; "Structure, Function and Replication of Centrioles," to the Department of Biology, Texas Southern University, July 6, 1970; "Centriole Replication during Ciliogenesis," to the Department of Anatomy, Queen's University, Kingston, Ontario, November 23, 1970; "Centriole Replication and Rootlet Formation during Ciliogenesis in the Rat Trachea," to the 14th Annual Meeting of the Canadian Federation of Biological Societies, Toronto, June 16–18, 1971.

V.I. Kalnins and H.J. Weinroth, "Friend Leukemia Virus Production in the Spleen and Survival of Mice differing at Histocompatibility Loci h-4 and h-7," to the Annual Meeting of the American Association for Cancer Research, Chicago, April 8–10, 1971.

A. Roberts and J.S. Thompson, "An Effect of Genotype on the Susceptibility to Atheromata produced by Diet," to the American Association of Anatomists, Philadelphia, April 1971.

J.S. Thompson, "Student Participation in Faculty Affairs," to the Association of Canadian Medical Colleges, Winnipeg, October 1970.

PUBLICATIONS

Kalnins, V.I. and Weinroth, H.J. "Friend Leukemia Virus (FV) Production in the Spleen and Survival of Mice Differing at Histocompatibility Loci H-4 and H-7" (*Cancer Research*, vol. 12, 1971, p. 82).

Roberts, A. and Thompson, J.S. "An Effect of Genotype on the Susceptibility to Atheromata produced by Diet" (*Anatomical Record*, vol. 169, 1971, p. 411) (abstract).

Stephenson, J.R. and Axelrad, A.A. "Separation of Erythropoietin-sensitive Cells from Hemopoietic Spleen-Colony-forming Stem Cells of Mouse Fetal Liver by Unit Gravity Sedimentation" (*Blood*, vol. 37, 1971, pp. 417–27).

Thompson, J.S. "How to Banish 'Specter' of Student Power" (*Medical Post*, March 23, 1971, p. 18).

ART AS APPLIED TO MEDICINE

Under the direction of Professor Nancy Joy

During the three years since the inauguration of the b.sc.aam programme, the academic stature of the Department has developed on a broad base, attracting a better

selection of qualified student applicants; and, for staff, leading professionals from Mexico and the USA as well as Canada, who have contributed their time for periods ranging from a few days to six or seven months, to teach in areas of their special expertise. The size of the classes in each of the three years has increased from two or three students to a more satisfactory and stable group of five per year.

Electives always face pressure from competing demands on time. Nevertheless, those offered by the Department have found favour with medical students, among whom one has enrolled for a second year.

As is to be expected of any course which is, globally, the only one of its kind outside the United States, our graduates have taken posts not only across Canada but in England, Sweden, and the United States. New job opportunities have been created within the University and in two of the teaching hospitals, and three or four graduates have also established themselves in Toronto in self-employed, freelance roles serving a large geographic area, attracting work from the USA as well as from Canada. Several graduates have been accepted into programmes at the University of California (Berkeley) and McGill, for courses leading to Master's degrees.

The session 1970–71 has seen the Department assume responsibilities for an increasing number of major special activities within a heavy educational bias. The first of these involved student and staff participation in the promotion and displays for *Vertigo '70* – a Medical Society confrontation with the non-medical use of drugs. Medical students organized this as a learning-oriented programme involving films, lectures, and discussion groups. The project was reinforced by an experiment in the design and adaptation of the adjacent environment by the AAM students whose objective was to create mood and attitude changes and increased awareness of the problems under discussion. Though only partially successful, this effort was entertaining and conducive to informal conversation among the participants.

The formal opening in October 1970 of the Medical Sciences Building provided a new challenge of a different sort. The handsome pictorial brochure designed by Margot Mackay for the occasion became immediately a collector's item.

Towards the end of April, Health Sciences Film Festival Workshop '71 replaced for this year the AAM students' annual Open House. It proved to be a highly successful innovation. The event, sponsored by the Division of Postgraduate Medical Education, was arranged by a striking committee of three – Nancy Joy, Dr. Hugh Barber, and Dr. David Briant. For the occasion some 50 locally made health science films were assembled and displayed and their production teams, distributors, sponsors, and other interested persons were invited to meet each other and to contribute from their various areas of expertise to panel discussions on film production, distribution, and related legal and ethical matters. D.A. Gibson, Dr. Helen Evans Reid, and Leonard Bertin shared the responsibility of moderating and the panelists included David Walker (Yale University), Sidney Dymond, QC, and Gary Cousins, a student in the B.SC.AAM programme. Preceding the panel discussion in the auditorium, a selection of films of special interest were introduced by their authors. Included was a one-minute experiment by Les Mezei using computer animation to simulate an aspect of the physiology of digestion.

Concurrent with panel discussions, the simultaneous projection of films on six screens set at various sites in the lobby and mezzanine of the auditorium was an interesting, successful experiment in the use of unwalled space for multiple screening.

One of the features of the Festival was the demonstration of a new teaching carrel, the "Honeycomb Constudium," which was designed in the AAM Department in collaboration with Professor Donald Forgie of the School of Library Science. Internova Industries have signed a contract with the Governors of the University to manufacture six variations of the design and it is anticipated that single orders may range from one unit to hundreds or even thousands for classrooms or libraries. A special feature of the design is the simplicity which lends itself to mass production, maximum ratio of usable desk to floor space, and nesting capability.

An integral part of the festival was an exhibit of AAM student work in the Alumni Lounge, which included displays demonstrating stages in the preparation of drawings for animation, graphics and models for TV, and work for other forms of reproduction.

A teaching film titled "Dizziness," which was conceived, scripted, and produced by members of the AAM staff working closely with Dr. Hugh Barber of Sunnybrook Hospital, was the only item to receive double recognition at Biocommunications '70, a joint meeting in Houston, Texas, of three of the largest international professional audio-visual associations in America. "Dizziness" received the Medical Education Award, in competition with 52 entries, and was placed second in the clinical category. Later in September the same film placed second among 54 entries at the International Medical Film and Videotape Festival held at Williamsburg, Va., by the Association of Medical Television Broadcasters. Noteworthy in the film's design is an unusual and perhaps unique use of polarized light which enables visual simulation of surges, and of different information flow rates, to be shown simultaneously and compared. An arrangement has been made between the film's makers and the Governors of the University which establishes the Governors as owners of the copyright and permits the AAM Department to handle this film as an exercise to study problems of film distribution. In the highly problematical event that a financial profit results, 80 per cent of the proceeds will be shared by the Departments of Otolaryngology and Art as Applied to Medicine.

Modifications in the AAM programme included changing Sculpture from a compulsory to an optional requirement and an informal arrangement with the Ontario College of Art which gave AAM students the option of attending a life class at the College. Miss Mary Lorenc, medical artist on leave of absence for seven months from the University of New York, supervised, in collaboration with Professor V.I. Kalnins, several art projects designed to develop ability to visualize structures in three dimensions at magnifications that are obtained with the electron microscope. This class may be continued by Dr. Kalnins, assisted by one of her students who graduates at the Spring convocation.

D.A. Gibson, Director of Audio Visual Services for Dalhousie University, and David Walker, Editor of Yale Reports, who were special guests at the Health Science Film Festival Workshop '71, spent additional time with the AAM students, talking to them about their own departments and conditions in other centres. Senior AAM students, working under the supervision of Dennis Pike, Executive Film Director for Ontario Place, created an animation sequence to explain the complexities of arterial and venous blood flowing at different rates in mingling streams that are affected by intermittent sphincter action. Dr. A.M. Rappaport has incorporated this piece of animation into his movie on microcirculation of the liver.

The course in Photography has become more meaningful with improved darkroom facilities, the full benefit of which will be apparent next year.

Staff-student meetings were held this year on a more formal basis than before and a committee comprised of nine staff members and three students to look into the curriculum is expected to continue its work next session.

HONOURS

(*a*) Medical Education Film Award (52 competing) and (*b*) 2nd Award in clinical category; both received by John Kozie on behalf of the production team, Dr. H.O. Barber and AAM Staff, for film "Dizziness" at joint meeting of the Association of Medical Illustrators, the Biological Photographic Association, and the Council on Medical T.V., Houston, Texas, August 1970.

Second Film Award (54 competing) received by Nancy Joy on behalf of the production team, Dr. H.O. Barber and AAM Staff, for film "Dizziness" at Medical Videotape and Film Festival, sponsored by the Association of Medical Television Broadcasters, Williamsburg, Virginia, September 1970.

SCHOLARLY ADDRESSES

N. Joy, "Health Science Film Festival Workshop '71: Objectives of the Session Outlined," Programme sponsored by the Division of Postgraduate Medical Education, Medical Sciences Building, 27 April, 1971.

M. Mackay, "Tape Slides," address to the Nurses' Audio Visual Committee of the Toronto General Hospital, November 1970.

PUBLICATIONS

Blitz, E., Cousins, G. and Lundquist, P. *Tooth Migration in a Crowded Dentition.* 4 min., silent, 16 mm. colour, animated film. Toronto: Department of Art as Applied to Medicine, 1971.

Hough, B. (film illustrator). *Microsurgery of Intracranial Aneurysms,* by W.M. Lougheed. 18 min., optical sound, 16 mm. colour. 1970.

——— (film illustrator). *Arterio-venous Malformation,* by W.M. Lougheed. 7 min., optical sound, 16 mm. colour. 1970.

Wherry, M. (film illustrator). *Carotid Venous By-pass,* by W.M. Lougheed. 5 min. optical sound, 16 mm. colour.

BACTERIOLOGY

Under the direction of Professor N.A. Hinton

During the past year the Department has engaged in a major reorganization programme. The ability of the Department to meet its responsibilities in undergraduate, graduate, and postgraduate programmes is dependent upon the development of a cohesive organization and the acquisition of new staff facilities and space. This will obviously take some years. The vigour of the relatively new unit at Sunnybrook Hospital, under the direction of Dr. I.B.R. Duncan, the development of new laboratories in the Women's College Hospital under Drs. A.W. Gray and K.F. Givan, the new construction at New Mount Sinai Hospital under Dr. J.A. Smith and at the Hospital for Sick Children under Drs. T.E. Roy and P.J. Middleton, and the renovation of facilities at the Toronto General Hospital and in the Banting Institute under the direction of Drs. N.A. Hinton and P.G. Tuffnell will significantly enhance the capacity of the Department. An active search for new and highly qualified faculty is being conducted at the present time.

The first complete programme in infections was presented to the medical students in the new curriculum. The programme involved lectures, seminars, tutorials, and demonstrations three half-days per week for the duration of Period IIA. Although a range of changes must be made in the coming year, the Department felt that the progress and participation of the students was more than adequate and the student assessment of the system was generally complimentary.

Undergraduate teaching to other students in the Health Sciences and to Arts and Science students and graduate teaching have involved many members of this Department through cross appointments in the Department of Microbiology in the School of Hygiene. During the past year members of the Department made major contributions to the Microbiology programme for B.SC. Nurses, in the Diploma in Bacteriology, and in various graduate courses. One M.SC. student, two PH.D. students and one postdoctoral Fellow were under the direct supervision of Department members.

Postgraduate programmes continue to make heavy demands upon our Department. The bulk of our activity has been associated with participation in lectures, seminars, and rounds in the programmes of other departments. Two postgraduate candidates in Microbiology are now registered in our programme and are presently completing a period of training at Sunnybrook and Women's College Hospitals. Two

more are to be introduced next year at the Hospital for Sick Children and the Toronto General Hospital. It is clear that a more structural programme must be introduced in Clinical Microbiology to accommodate these candidates, the group training in Clinical Pathology, and postgraduates in other specialties.

Participation in teaching under the Division of Postgraduate Medical Education was active during the year. Ten members of the Department were involved in the Refresher Course for Pathologists in Practice, six in the Postgraduate Day on Clinical Pharmacology, and eight in the Advanced Graduate Course in Medicine and Surgery.

An interesting development during the year has been the growth of an Interhospital Infection Control Group under the aegis of this Department. This group has been meeting monthly, with programmes arranged in rotation in the various teaching hospitals. Attendance has averaged over 100, composed of microbiologists, physicians, nurses, and technologists, and now involves over twenty hospitals. This group will clearly develop formal organization next year and constitutes an ideal communication and education vehicle in the area of hospital infection control.

RESEARCH

At Sunnybrook Hospital, Dr. I.B.R. Duncan began two new research projects, one on the antibiotic sensitivity of strains of Pseudomonas aeruginosa and another on the toxicity of gentamicin.

Dr. S. McDonald was engaged in a project relating to the taxonomy of a new strain of Enterobacteriaceae.

In addition to carrying out their own research, members of the Department at Sunnybrook Hospital co-operated in the research projects of various colleagues within the hospital and in other laboratories. These projects included: the bacteriological aspects of a study of wound infections in experimental animals carried out by a member of the Division of Orthopaedics; an investigation of the epidemiology of Proteus rettgeri carried out with members of the Bacteriology Department of University of Toronto; co-operation with the Canadian Communicable Disease Centre in Ottawa in a study of a new method of typing strains of Pseudomonas; and investigations of strains of Citrobacter being carried out at the Hospital for Sick Children, Toronto.

Dr. P.C. Fleming, at the Hospital for Sick Children, has been studying the role of beta-lactamase as a determinant of penicillin resistance, and has been associated with two major co-operative studies on bacterial meningitis and osteomyelitis.

Dr. P.J. Middleton has been investigating the application of fluorescence microscopy to the study of problems in diagnostic virology. He has also been engaged in the study of slow virus infections of the central nervous system.

At New Mount Sinai Hospital, Dr. J.A. Smith has been working on a computerized surveillance of hospital infection.

Dr. K.F. Givan, Women's College Hospital, has been studying the use of spectinomycin in the treatment of "resistant" gonorrhoea.

At the Wellesley Hospital, Dr. W.-D. Leers is involved in a study of lysozymal effect on the bacterial cell wall.

Dr. A.E. Frankin is continuing his studies on serologic responses to viral infection in connective tissue diseases at Wellesley Hopital.

In the Department of Bacteriology in the Banting Institute, Dr. N.A. Hinton, in collaboration with Dr. J.L. Penner, is engaged in studies on urinary tract infection and the epidemiology of infection due to Proteus organisms.

SCHOLARLY ADDRESSES

Dr. P.C. Fleming addressed a combined meeting of the Royal Society and the Royal Society of Medicine in London, England, in May 1971, speaking on the penicillins in the treatment of osteomyelitis. He also spoke at the annual meeting of the Ontario Medical Association in May 1971 on the subject of neonatal infections.

Dr. P.J. Middleton addressed the Canadian Society of Microbiologists, Central

Ontario Branch in March 1971, reporting on the application of specific inhibition of viral replication in the chemotherapy of viral diseases of man.

At the Fourth Annual Canadian Conference on Research in Rheumatic Diseases, held in October 1970, Dr. A.E. Franklin spoke on microbiological antibody studies in seropositive and seronegative rheumatoid arthritis. He also took part in the Symposium on slow viruses at the annual meeting of the Royal College of Physicians and Surgeons, held in Ottawa in January 1971. Dr. Franklin also addressed the Ontario Antibody Club at Princess Margaret Hospital in March 1971, on the Epstein-Barr virus and Burkitt's lymphoma.

Dr. K.F. Givan spoke at the Canadian Public Health Association annual meeting in Ottawa in November 1970 on the multiplication of Pseudomonas species in phenolic germicidal-detergent solution. She also addressed the Clinical Research Society of Toronto at its annual meeting in May 1971 on antibiotic resistance of gonococcal strains from the Toronto area.

Dr. W.-D. Leers participated with others in reporting to several groups in April 1971 at the F.A.S.E.B. Convention in Chicago, on the bacteriolytic and bactericidal activity of sera in mono- and myelomonocytic leukaemia; at the annual meeting of the American Rheumatism Association in New York in June 1971 on bacteriolytic and bactericidal activity of sera and synovial fluids in rheumatoid arthritis; to the Canadian Federation of Biological Societies in London, Ontario, in June 1971 on the subject of bacteriolytic and bactericidal activity of maternal and cord sera.

Dr. N.A. Hinton addressed the Urology Department of Stanford University in March 1971, speaking on urinary tract infections.

Dr. J.L. Penner, at the annual meeting of the Canadian Association of Medical Microbiologists held in London, Ontario in June, presented a paper on the serotyping of Proteus rettgeri.

PUBLICATIONS

Duncan, I.B.R. "Gram-negative Infections in General Hospitals"; in *Proceedings, Symposium on the Gram-negative Bacteria*, p. 7, 1969, Schering, Montreal.

Fleming, P.C. *et al.* "Use of Cephalosporins in Identification of Enterobacteriaceae" (*Postgraduate Medical Journal*, Supplement vol. 46, 1970, p. 51).

——— "Cephaloridine and the Penicillins in the Treatment of Osteomyelitis and Arthritis" (*ibid.*, p. 89).

Gray, A.W. *et al.* "Antibody Response to E. coli Urinary Tract Infection." (*Canadian Journal of Public Health*, vol. 62, 1970, pp. 57–60).

Hinton, N.A. "Effect of Oral Tetracycline HCl and Doxycycline on the Intestinal Flora" (*Current Therapeutic Research*, vol. 12, 1970, pp. 341–52).

Leers, W.-D. "Phycomycosis Involving the Intestine and Anterior Abdominal Wall: A Case Report" (*Annals of Surgery*, vol. 171, 1970, pp. 303–8).

McDonald, S. *et al.* "A Case of Human Vibriosis" (*C.M.A.J.*, vol. 103, 1970, p. 951).

Middleton, P.J. "Severe Myositis during Recovery from Influenza" (*Lancet*, Sept. 12, 1970, pp. 533–5).

Tuffnell, P.G. *et al.* "Studies on the Absorption and Distribution of Doxycycline in Normal Patients and in Patients with Severely Impaired Renal Function" (*C.M.A.J.*, vol. 103, 1970, p. 1031),

——— "Endocarditis Caused by Paecilomyces varioti affecting an Aortic Valve Allograft" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 61, 1971, p. 278).

——— "Pseudomonas Aeruginosa in Respiratory Illness: Endogenous or Exogenous." (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, p. 516).

BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

Under the direction of Professor I.B. Fritz

The efforts of most staff members in BBDMR continued to be devoted primarily to research in the area of metabolic control. A summary of research activities and a list

of associated publications are submitted in a separate report. All members of the BBDMR were successful in obtaining adequate financial support from outside granting agencies, particularly the MRC, necessary for the conduct of research projects.

During 1970–71, activities in BBDMR tended to become consolidated. The rapid growth phase through which the Department developed during the two previous years began to taper off. The only new additions to the academic staff were Drs. Alexander Marks (assistant professor) and Jennifer Dorrington (research associate). Renovations to existing laboratories and additions to the communal facility rooms were continued, but at a considerably reduced rate. The seminar programmes remained highly active during 1970–71.

The BBDMR application to the School of Graduate Studies to obtain autonomous departmental standing has thus far been unsuccessful, in part because of the difficulties associated with obtaining acceptance for any new graduate programme in Ontario at this time. During this year, our Department presented new graduate level courses on the Principles of Metabolic Control I and II. Lectures were widely attended by staff and postdoctoral fellows, but only a few students formally registered for the course. These courses were offered under the auspices of the graduate "Department of Physiology and Banting and Best Research." In view of these special circumstances, the staff members elected to spend more effort in mounting suitable postdoctoral and postgraduate programmes in the interdisciplinary area represented by the department.

RESEARCH

The synthesis of phosphonic acid analogues of phospholipids and carbohydrate metabolites was continued by Professor E. Baer and his colleages, Dr. N.N. Mody (optical resolution of 2,3-diphosphono-DL-glyceric acid), Dr. S.K. Pavanaram (synthesis of phospholipids containing (N-methyl)-ethanolamine and (N-hydroxy-ethyl)alanine as nitrogenous moieties), and Dr. Ranaga Robinson (synthesis of glyceraldehyde-3-phosphonate, dihydroxyacetonephosphonate, and resolution of 2,3-diphosphono-DL-glyceric acid). The staff was ably assisted by Mr. H.H. Flehmig.

Professor Dmytro Buchnea has synthesized various optically active, mixed acid, saturated and polyunsaturated diacyl-sn-glycerols as reference compounds for the natural 1,2-diacyl-sn-glycerols to duplicate.

Professor James M. Felts and members of his laboratory have engaged in research on the mechanisms of fatty acids and cholesterol metabolism. Three main projects are currently in progress. The first is concerned with an investigation of the mechanism of activation of the enzyme lipoprotein lipase (LPL). This enzyme plays a key role in the assimilation of dietary triglycerides which enter the circulation as large lipoprotein molecules – the chylomicrons and very low density lipoproteins. It has long been known that heparin interacts with LPL. However, under certain conditions it inhibits enzyme activity and under other conditions it increases enzyme activity. Dr. Felts and co-workers have evidence that heparin functions as a specific allosteric modifier of LPL so that at low substrate concentrations the reaction rate is very slow, and at high substrate concentrations the reaction is greatly accelerated. Thus, heparin modifies LPL so that it serves as a metabolic "thermostat" and may be of great importance in "setting" the level of circulating triglycerides. The discovery of this interaction between heparin and lipoprotein lipase may have important implications in the interpretation of a number of hyperlipidemic disease states.

The second project is an investigation of the absorption and assimilation of dietary cholesterol in the rabbit. This animal model is ideal in a study of the relationship between cholesterol and the development of atherosclerosis since small increases of cholesterol in the diet cause a rapid onset of the disease. Two types of lipoproteins, chylomicra and very low density lipoproteins (VLDL), are responsible for transporting all of the newly absorbed cholesterol into the body, with the VLDL being the major transport form. These lipoproteins are made in the intestine and enter the body in the

lymph. It has not been previously appreciated that the VLDL is important in this process. The lipid and protein moieties of these lipoproteins have been characterized to determine what differences exist between them. Results indicate that size seems to be the primary difference. Studies of the metabolism of these particles are in progress to find out if there are differences in the metabolism of the two different particles. When these lipoproteins are isolated and reinjected into recipient animals, much of the cholesterol of these lipoproteins is found in the liver soon after injection. Some is found in other normal plasma lipoproteins. Since the liver is the primary site of degradation of cholesterol, a study of the interaction of free and esterified cholesterol of lipoproteins with intact isolated liver cells is planned next. This study will yield information on the mechanisms by which cholesterol is cleared from the blood.

The third project is being carried out in collaboration with Dr. Peter A. Mayes who is on sabbatical leave from the University of London. Dr. Mayes is being supported by the Charles H. Best Foundation. This project is a study of the role of blood oxygen tension on the development of fatty infiltration of the liver. A rat liver perfusion system has been developed which allows perfusion of the organ as any desired oxygen tension. Livers will be perfused at 100, 75, and 50 mm Hg oxygen tension. The metabolism of ^{14}C-labelled free fatty acids will be measured to determine the extent to which controlled hypoxia influences the oxidation of long chain fatty acids to CO_2 and ketone bodies and the esterification of fatty acids to triglycerides and phospholipids. The production of endogenous VLDL will also be followed. The results of this study will provide information on whether normal liver oxidative and synthetic processes can continue in the face of reduced splanchnic flow and oxygen limitation.

Research Projects in the laboratory of Dr. Irving B. Fritz are as follows:

(1) Studies on the role of carnitine in intermediary metabolism: (*a*) With Dr. Sean Brosnan, studies on the mechanisms of fatty acyl group translocation across mitochondrial membranes were continued. The factors controlling the operation of the carnitine palmitoyltransferase reaction in this process were investigated. In addition, the distribution volumes of carnitine and acetylcarnitine in mitochondria were compared with the water and sucrose spaces of rat and calf liver mitochondria. (*b*) With Dr. Mitchel Halperin, the effects of methylmalonic acid on the inhibition of malate transport by mitochondria were investigated with respect to the possible mechanisms of metabolic impairments in organisms having methylmalonic aciduria. (*c*) With Mrs. Bozena Kopec, carnitine palmitoyltransferase was purified to apparent homogeneity, and the properties of the enzyme were investigated. The varying substrate specificity towards different chain-length fatty acylcarnitine and CoA derivatives was established, leading to the tentative conclusion that there is a family of intermediate and long-chain carnitine acyltransferases, one of which may be a transformation product of carnitine palmitoyltransferase. (*d*) With Dr. Leo Lee, the control of ketogenesis in rat liver was investigated, and the importance of the control of CoASH concentrations was established as one of the more important determinants of the rate of ketogenesis. In addition, ketogenesis during development was explored, and the initial steps of fatty acid activation and transport were implicated as the likely factors limiting ketogenesis in liver preparations from foetal rats. The role of carnitine and carnitine acyltransferases in allowing translocation of acyl groups within putative heterogeneous pools in mitochondria was also investigated. (*e*) With Dr. C.R. Liang, the metabolism of propionate by rat liver was investigated, with emphasis on the factors controlling the metabolism of propionyl CoA and propionylcarnitine. The concentration of acetyl CoA and acetylcarnitine in livers from fed and starved rats were compared with those of propionyl CoA and propionylcarnitine under the same conditions. The activities of propionyl CoA carboxylase and methylmalonyl CoA mutase in livers from fed and starved rats were determined, and the rates of oxidation of propionate by intact liver cells during different nutritional conditions were measured.

(2) Studies on the hormonal control of spermatogenesis in regressed hypophysectomized rats: (*a*) With Drs. V.L.W. Go and R.G. Vernon, the Staput technique for the separation of testicular cells from rats was validated by various criteria, and stud-

ies were initiated on the differentiation kinetics of spermatogenesis in normal and hypophysectomized rats. The usefulness of carnitine acetyltransferase as a marker enzyme for the investigation of the transition of spermatogonia into primary spermatocytes was established. The minimal hormonal requirements for the minimal length of time required to restore spermatogenesis in hypophysectomized rats were investigated, using criteria described above. In addition, light microscopic and electron microscopic studies of the morphology of spermatogenesis during various hormonal treatments of hypophysectomized rats were initiated. Tissue and cell culture techniques for the investigation of spermatogenesis were also initiated. (*b*) With Dr. Jennifer Dorrington, the role of hormones in regulating the adenyl cyclase activities of various testicular cells was initiated. Methods for determining concentrations of cyclic AMP in small numbers of testicular cells were established. (*c*) With Dr. C.H. Lin, the rates of oxidation of palmitate and pyruvate by testicular cell preparations from various aged rats were determined in preparation for a more extensive series of studies on metabolic pathways operating in specific testicular cell types.

Professor M. Clelia Ganoza and her staff have continued to study various aspects of the mechanism of protein biosynthesis using techniques of genetics and biochemistry.

(1) Studies on the mechanism of chain propagation: The protein "X," discovered in this laboratory, was extensively purified and shown to function in some aspect of the mechanism of translocation. This protein may mediate the formation of a complex between the propagation factors T and G. This complex then functions as the biologically active intermediate which stimulates condensation of amino acids on ribosomes.

(2) Studies on the mechanism of chain termination: A protein, R_3, also discovered in this laboratory, by its ability to interact with the termination codons UAA and UGA, was found to be defective in a conditionally lethal mutant (N4316) defective in protein synthesis. This mutation suppresses the termination triples UAA and UGA but no other codons tested.

This observation predicts that a new species of tRNA's exist in cells which do not harbour suppressing tRNA's. These new RNA's must recognize termination codons as sense codons in the absence of the protein R_3, which is defective in the N4316 mutant. The latter component stimulates chain termination with a phage messenger RNA, but fails to activate release in model systems. R_3 was purified free of other proteins known to stimulate initiation, propagation, and termination. Since the principal difference between the termination signals of the artificial model system and those of the phage messenger RNA is the presence of a double termination codon messenger in the latter, it is quite possible that R_3 functions in release only when an mRNA contains such a dual release signal.

We have consequently asked whether multiple release codons may also be the required signals for chain termination in the intact cell. It is possible to observe 50 per cent suppression of UAG, UGA, and UAA. This means that one out of every other protein synthesized has accepted an amino acid rather than read a single release codon to terminate. By inserting the Su^+ tRNA gene (UAG suppressor) into cells harbouring suppressors for UGA, we were able to learn that a dual codon containing UAG and UGA cannot be important to the cell. Only suppression of UAA and UGA combinations results in lethality. The UAA, UAG combination has not been tested so far. Nevertheless these experiments allow us to conclude that: (i) a new set of tRNA's exist in cells; (ii) normal chain release requires multiple codons of which those containing UAA are most important; (iii) a new protein mediates the normal mechanism of protein chain termination; (iv) the ability to isolate a peptidyl tRNA next to a termination codon has opened up a single means of studying the mechanism of protein chain termination with natural messenger RNA's and has served as a means of synchronizing protein synthesis so that the mechanism of intragenic initiation can now be examined. The most challenging question which remains is whether previous work with model systems scored for a salvage mechanism of release, or whether all components re-

quired in those model systems are also needed for the completion of protein molecules.

(3) Studies on the functional distinction between membrane bound and free ribosomes in hepatic cells: Previous work from this and other laboratories established that the ribosomes of hepatic cells were partitioned in the biosynthesis of protein. Membrane bound ribosomes synthesize secretory proteins in cell free extracts, whereas ribosomes free of membranes synthesize cytoplasmic proteins. We have, in collaboration with Dr. Francis Rolleston, been able to show that bound ribosomes also synthesize a variety of membrane proteins. Hence the association of ribosomes with membranes is important not only to the partitioning of secretory proteins but also to the assembly of membrane structures in the cell.

Professor Alan G. Goodridge has continued to study the biochemical basis for the dramatic increase in hepatic fat synthesis which occurs when unfed, neonatal chicks are given a meal high in carbohydrate. The effect of the high carbohydrate meal can be mimicked *in vitro* in isolated hepatocytes by adding fructose or glycerol to the incubation medium. Fructose-stimulated fatty acid synthesis was inhibited by adding free fatty acids to the medium, suggesting that free fatty acids or a related metabolite may be the inhibitor of fatty acid synthesis in liver from unfed, neonatal chicks. This viewpoint was substantiated by the finding that a carbohydrate meal significantly decreases the *in vivo* intracellular concentration of free fatty acids in the liver. Considerable effort was expended to develop a new technique capable of separating minute quantities of free fatty acids from liver containing large amounts of triglyceride and cholesterol ester. This method involves chromatography of the lipid extract on DEAE cellulose, followed by thin-layer chromatography on silica gel. The purified fatty acid mixture was separated into individual fatty acids by gas-liquid chromatography.

The α-glycerophosphate concentration in isolated hepatocytes incubated with fructose was markedly elevated, suggesting that fructose may act by stimulating esterification of free fatty acids and, thereby, lower their concentration. Both *in vivo* and *in vitro* measurements of intermediate concentrations continue to be a major area of ongoing research.

Dr. Panee Silpananta, a postdoctoral research fellow, has completed her work on the synthesis and degradation of malic enzyme *in vivo* in chick liver. Dr. Silpananta developed a new technique for separating contaminants from specific radioactive antigens (malic enzyme in this case) in immunoprecipitates. The technique involves dissociation of the precipitate in acetic acid followed by polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulfate. Her study showed that the increase in enzyme activity which occurred with the feeding of neonatal chicks was due exclusively to an increase in the concentration of malic enzyme protein. The increase in malic enzyme concentration, in turn, was the consequence of an increased rate of synthesis of malic enzyme. Degradation of malic enzyme appeared to play a minor role in the regulation of the concentration of this enzyme. Dr. Silpananta is now working on the development of a tissue culture system in which we can study the induction of the adaptive enzymes of fatty acid synthesis. This work was begun by a summer student, Mr. Andrew Garay, who was able to maintain a primary culture of hepatocytes for up to five days. During this period a 25-fold increase in the activity of malic enzyme was observed.

Professor Arnis Kuksis has continued studies on the structure and metabolism of complex natural lipids by means of integrated radio-chromatographic and enzymic methods. The structure and turnover of individual molecular species of hepatic and plasma glycerophosphatides were determined, and their metabolic interrelationships in the rat were assessed. The synthesis and secretion of polyenoic liver lecithins was shown to be required for the formation of the polyunsaturated cholesteryl esters in plasma and for their clearance by liver *in vivo* (in collaboration with B.J. Holub); the transfer of the plasma low and high density lipoproteins to the egg yolk was shown to proceed in the laying hen without change in their immunological properties despite alterations in lipid composition (in collaboration with S.S. Mookerjea, T. Delahunty,

and D.A. Gornall); comparable rates of utilization of both 1,2- and 2,3-diacyl-sn-glycerols in triglyceride synthesis were demonstrated in the microsomes of rat liver and intestinal mucosa *in vitro* despite a preferential biosynthesis of the 1,2-diacyl intermediates *in vivo* (in collaboration with D. Buchnea and P.J. O'Doherty); detailed analyses of the molecular species of lipids of purified preparations of ATPase and sarcotubular membranes of the skeletal muscle of rabbit revealed similar compositions for the enzymes and the corresponding parent membranes (in collaboration with D.H. MacLennan and L. Marai); a study of the mechanism of triglyceride hydrolysis by lipoprotein lipase of milk was initiated (in collaboration with N. Morley). In addition, a gas chromatographic method was developed for the separation of natural glycerides on the basis of unsaturation, using polyester liquid phases. Such separations in the past were possible only with fatty acids (in collaboration with D. Buchnea, S.K.F. Yeung, and O. Stachnyk).

The following research activities are being carried out in Professor John Logothetopoulos' section: (*a*) the effect of continuous glucose infusions in rats on the rates of proinsulin and insulin secretion and synthesis of pancreatic islets isolated and incubated *in vitro*; (*b*) the isolation and purification of postheparin lipoprotein lipase and the induction of antilipoprotein lipase antibody; (*c*) electron microscopy studies of pancreatic islets stimulated by glucose *in vivo* and *in vitro*.

Dr. Horst Kern and Dr. Claus Heuck from the University of Heidelberg are spending a year in the laboratory on Fellowships from the German Forschungsgemeinschaft. They collaborate on the above projects.

Work in Professor D.H. MacLennan's laboratory centres around the resolution and reconstitution of components of the calcium transport system of sarcoplasmic reticulum. Characterization of the Ca^{++}-dependent adenosine triphosphate, which we have purified, is a continuing project. We have also isolated and partially characterized a calcium-sequestering protein. The involvement of this protein in calcium binding and release is presently under study.

Professor A. Marks joined the BBDMR in October 1970. The possibility of splitting the chromosome into its constituent functional units, genes, is a first step towards the chemical analysis of the base sequence of the hereditary material, DNA. The isolation of a single gene, 80 nucleotides long, coding for a specific transfer RNA, is a useful model system for the development of techniques for gene isolation. Hybridization of tyrosine transfer RNA with the DNA of the transducing bacteriophage $\Phi 80psu\frac{+}{III}$ which carries a gene coding for tyrosine transfer RNA, and subsequent enzymatic digestion, permits an experimental approach to the problem of isolation of a single gene.

In Professor S.S. Mookerjea's laboratory, metabolic effects of phosphorylcholine, CDP-choline and other nucleotides on the processes of glycoprotein and protein synthesis are being continued. CDP-choline has been shown to stimulate N-acetylglucosaminyl transferase activity in different rat liver cell membranes. CDP-choline also stimulated the transfer of N-acetylglucosamine into an acidic glycolipid product (in collaboration with A. Chow, D.E. Cole, and P. Letts). Further work on the characterization of the acidic glycolipid (in collaboration with Dr. A. Kuksis) and possibility of a transfer of carbohydrate from the lipid into protein acceptors (in collaboration with Dr. H. Schachter) are continuing. Effect of CDP-choline on the glycosylation of plasma lipoproteins in a cell-free system has indicated a role of lecithin biosynthesis in lipoprotein assembly (in collaboration with Dr. T.J. Delahunty). A cell-free microsomal system normally used for studying polypeptide synthesis has been shown to be extremely active for lecithin synthesis and addition of phosphorylcholine and different nucleotides into such a system promoted amino-acid incorporation into acid-insoluble proteins (in collaboration with E. Marai). Mr. D. Field has completed his work for the M.Sc. degree and has found that orotic acid feeding decreased the incorporation of glucosamine into plasma lipoproteins. The occurrence of N-acetyl-glucosaminyl transferase, a membrane-bound enzyme, in human and rat sera has been discovered (in collaboration with A. Chow and R.L. Hudgin). A very high activity of this en-

zyme has been observed in liver cell membranes of the laying hen compared to the immature pullet (in collaboration with D.A. Gornall, A. Kuksis, and L. Pinteric).

Research in Professor F.S. Rolleston's laboratory has been centred on the hypothesis that the functional difference between free and membrane bound ribosomes in liver results because only bound ribosomes have the potential to bind to membranes. Two approaches are being used.

(1) *In vitro* binding of ribosomes to membranes is being assayed by mixing ^{3}H-labelled ribosomes with endoplasmic reticulum, incubating, and then separating membranes from ribosomes by centrifugation. The conditions for reliable assay of binding have been established, and it has been shown that the 60S ribosomal subunit binds efficiently to membranes, whereas the 40S subunit binds only weakly. However, binding by ribosomes extracted from endoplasmic reticulum is no better than that by free ribosomes under the wide range of conditions assayed. This result says the original hypothesis is invalid but, like all negative results, is open to the criticism that the correct conditions to show specificity have not yet been obtained.

(2) *In vivo* assay of binding of ribosomes is being attempted by a cell fusion approach. This involves fusing, with inactivated Sendai virus, a radioactively labelled cell type containing a low proportion of bound ribosomes (Ehrlich Ascites tumour cells or reticulocytes) with one containing a high proportion (plasmacytoma or hepatocyte cells), and following the proportion of bound and free labelled ribosomes after fusion. This experiment is now at the stage of having obtained the required cell fusions, but procedures for separating fused from non-fused cells are not yet worked out.

A third project is concerned with the site of synthesis of membrane proteins, and is being carried out in collaboration with Dr. M.C. Ganoza. Free ribosomes make soluble tissue proteins and membrane bound ribosomes make serum proteins. Polyacrylamide gel electrophoresis has provided strong evidence that bound ribosomes also make membrane proteins, but final proof depends on immunochemical analysis of the proteins synthesized by these two groups of ribosomes. This is now being carried out by Dr. C.A. Williams.

Dr. Bruno Rosenfeld has completed an investigation on the effects of early choline deficiency on the phospholipids in the hepatic nuclei of the rat. It has been established that a single feeding of a choline-deficient meal and, still more, two feedings of the deficient diet lead to a progressive fall of nuclei phosphatidylcholine and an increase of phosphatidylethanolamine. With a normal method of phospholipid separation, we were also able to measure with precision the minor phospholipids in nuclei. In distinction to phosphatidylcholine and phosphatidylethanolamine, no changes in amounts of minor phospholipids in nuclei were induced by choline deficiency. The results of these experiments are now being prepared for publication.

The research in Professor B.P. Schimmer's laboratory is directed towards identifying the sites and mechanisms of hormone action in differentiated cells with primary emphasis on the action of hormones on adenyl cyclase. Studies on adrenocorticotropic hormone (ACTH)-sensitive and mutant adrenal tumour cells grown in tissue culture have provided evidence for the obligatory role of the adenyl cyclase system in ACTH-stimulated adrenal steroidogenesis. In cultured glial tumour cells from rat brain, catecholamines have been demonstrated to activate adenyl cyclase, suggesting that this enzyme plays a role in glial-neural communication.

A biochemical study on the factors which caused a mutant of *Escherichia coli* to lose its normal capacity to accumulate lactose and lactose analogs was initiated in Dr. P.T.S. Wong's laboratory. It was found that the extract from the wild type could restore the active transport. When the stimulating factors in the extract were examined, phospholipids had little effect, but the free fatty acids were found to be effective. Stearic acid gave the most stimulation and saturated fatty acids were better than unsaturated fatty acids. The effect of fatty acid decreased as the carbon-chain length decreased. It was proposed that fatty acid changed the confirmation of the abnormal membrane carriers in the mutant of *E. coli*.

Much of the work done by Professor G.A. Wrenshall has proceeded in collaboration with Dr. M. Vranic (Department of Physiology). The following represents a summary of observations based on experiments with intravascular injections of tracer glucose and tracer urea. The summary applies to the postabsorptive and one-day fasted grown dog.

In terms of the basal metabolic rate and of the three calorigenic foodstuffs (carbohydrates, fats, proteins), carbohydrates (glucose) contribute only 12 per cent of the caloric needs. Fats are consistently the major source of energy supply (88 per cent *minus* not more than 10 per cent contributed by body protein). In terms of the genesis of plasma urea in the non-diabetic dog, there is no discernible effect on protein catabolism of level running at 100 m/min.

In contrast, fasting depancreatized dogs deprived of insulin develop excess uremia *plus* hyperglycaemia during such running. Thus, nitrogen-bearing substances, initially body proteins, appear as a gluconeogenic source during running in the insulin-deprived dog. A fall in the rate of glucose utilization below that of glucose production causes the net hyperglycaemia of running.

Neither a fixed insulin supply nor a history of diabetes mellitus appears to be the primary factor in the excess uremia which develops during running. A catecholamine or catecholamines, reported to be released during muscular activity, may have a primary action.

This entire topic is the subject of further investigation.

Research carried out in Professor C.C. Yip's laboratory may be summarized as follows:

(1) An enzyme catalyzing the conversion of proinsulin to intact insulin has been purified to homogeneity as demonstrated by disc-electrophoresis. The kinetics of the conversion of proinsulin to insulin by this enzyme was studied and was found to involve a 2-step reaction: a rapid hydrolysis of the single-chain proinsulin to a double-chain intermediate and a slow hydrolysis of the intermediate to insulin. The conversion process was profoundly affected only by zinc which minimized the further degradation of insulin by this enzyme during prolonged incubation. This may reflect the importance of zinc in the *in vivo* biosynthesis of insulin because zinc has long been suspected of playing a role in the formation of β-cells of the pancreas. A manuscript describing these observations has been accepted for publication in the Proceedings of the National Academy of Sciences (USA).

(2) It has been possible to demonstrate that the initiation of proinsulin biosynthesis *in vitro* by slices of fetal bovine pancreas requires the participation of L-methionine, an amino acid not present in bovine proinsulin or insulin. Although methionine has been shown to play such a role in the initiating protein synthesis in bacterial systems, our observation is the first instance where such a role for methionine is demonstrated in an intact mammalian system. A manuscript on this observation is in preparation. This aspect of the research was carried out in collaboration with Dr. C.C. Liew of the Department of Pathological Chemistry.

(3) We have continued to study the *in vivo* hypoglycaemic effect of a proinsulin double-chain intermediate in the rabbit and have found that it has a slower and more protracted effect than insulin. Using ^{131}I-labelled intermediate, it has not been possible to demonstrate any conversion of this intermediate to insulin by the rabbit *in vivo*, suggesting that the hypoglycaemia effect may be intrinsic to this substance. Mr. J.K. Mills, an M.Sc. candidate, is responsible for carrying out this aspect of the research.

(4) Mr. A. Zimmerman, a Ph.D. candidate, has continued to purify insulin from guinea-pig pancreas and has been able to obtain good quantity of the hormone in homogeneity. Repeated mouse-convulsion assay of the hormone (kindly performed by CMRL through Dr. A.M. Fisher) showed a biological potency of 2 IU/mg, in good agreement with our own bioassays using rat diaphragms and fat pads *in vitro*. We have also found that guinea-pig insulin does not bind zinc and does not aggregate, in contrast to insulins from other species, which are known to bind zinc and to aggregate.

We have begun a detailed study of this guinea-pig insulin with respect to its hypoglycaemic action in guinea-pigs and have found thus far that this hormone appears to be more potent in this homologous system.

(5) Miss M. Moule, a Ph.D. candidate, has continued her study on the temperature regulation of the biosynthesis of proinsulin and insulin in fish (catfish). It has been possible to show that, although the overall biosynthesis of proinsulin is not affected by temperatures between 5–22°, the conversion of proinsulin to insulin is dramatically activated at about 18°. Other experiments using fish acclimated at different temperatures show that this temperature effect is the result of the activation of the enzyme(s) catalyzing the conversion reaction.

(6) In an attempt to elucidate the nature of proinsulin in the sera of cattle and of normal humans, we have been able to show that the proinsulin in circulation in both species is of the single-chain structure. In these experiments, we used a solid immunosorbant of Sepharose-anti-insulin to extract the proinsulin from the serum for further chemical and physical characterization.

(7) A method to obtain radioactive tritiated insulin is being developed in this laboratory. The process began with proinsulin which is tritiated with ^{3}H under very mild catalytic conditions for a period of 1–2 hours. The tritiated material is then purified and proinsulin is recovered through mild oxidization. The tritiated proinsulin is then converted to tritiated insulin using the converting enzyme we have purified (see (1) above). One batch of ^{3}H-insulin thus obtained has a specific radioactivity of about 144 C/mmole. The availability of ^{3}H-insulin at such high specific radioactivity makes it possible to study many aspects of insulin metabolism and the mechanism of action of this hormone. Using this ^{3}H-insulin, we have begun a study on the hormone receptor of insulin in plasma membranes.

HONOURS

C.H. Best was made Sr. Academico Honorario Extranjero, Academia Nacional de Medicina de Buenos Aires; the Banting and Best Department of Medical Research established The Charles H. Best Postdoctoral Fellowship; appointed Honorary Patron of The Cheshire Home for the Disabled; The Dr. Charles H. Best School, Coquitlam, B.C., was opened March 1971 by the President of the University of British Columbia.

I.B. Fritz was appointed Associate Editor of the *Canadian Journal of Biochemistry*; member of the Medical Research Council Grants Committee for Metabolism; Symposium Chairman on Insulin Action, to be held in conjunction with the 50th anniversary of the discovery of insulin in October 1971.

SCHOLARLY ADDRESSES

C.H. Best, "Fifty Years of Insulin," to The Royal Society of London; "Insulin in Retrospect and Prospect," to the British Diabetic Association; "The Future of Insulin," to Medical Faculty, University of Leyden; "Diabetes and Insulin," to Medical Staff and Scientists, Niels Steensen Hospital and Nordisk Insulinlaboratorium, Copenhagen; "The History of the Discovery of Insulin," to Medical Faculty and Medical History Society, University of Virginia, Charlottesville; "History of Insulin and Some Aspects of the Present Situation," The Rowntree Memorial Lecture, University of Miami; "The History of Insulin – The Present Situation," to the Canadian Diabetic Association, Winnipeg.

D. Buchnea, "Synthesis of 1-Stearoyal-2-Linoleoyl-sn-Glycerol," to the 10th World Congress of International Society of Fat Research; "Synthesis of Stereospecifically Substituted Mono-, Di- and Triacyl-sn-Glycerols," to the Symposium on Analysis and Biosynthesis of Glycerolipids, Houston, Texas; "Detritylation of O-Trityl-Acyl-sn-Glycerol and O-Trityl-Acyl-Propanediol Catalysed by Silicic Acid," to the Canadian Federation of Biological Societies, Toronto.

J.M. Felts, "The Role of Heparin as a Possible Allosteric Modifier of Lipoprotein Lipase," to the American Oil Chemists' Society Annual Meeting, Houston, Texas; "Activation Factors for Lipoprotein Lipase," to the International Symposium on Atherosclerosis, Toronto.

I.B. Fritz, "Levels of Metabolic Control," at the Opening Ceremonies of the Medical Sciences Building; "Hepatic Ketogenesis during Development," to the Department of Biology, National Research Council of Canada, Ottawa; "Insulin Action," to the Canadian Society for Clinical Investigation, Ottawa; "A Review of the Mode of Action of Insulin," to the Department of Medicine, McMaster University, Hamilton; "Hormonal Control of Spermatogenesis" (with Drs. V.L.W. Go and R.G. Vernon), at the Differentiation Symposium, University of Toronto.

M.C. Ganoza, Discussant on the Protein Synthesis Session at Canadian Federation of Biological Sciences; "Studies on the Mechanism of Polypeptide Chain Termination," at MacMaster University, Hamilton; "The Function and Distribution of Membrane Bound and Free Ribosomes in Hepatic Cells," to Symposium on Cellular Biology, Laval University, Quebec; "Biosynthesis and Secretion of Immunoglobulins," to Department of Immunology, University of Toronto; "Participation of Ribosomes on Recognition, Catalysis and Translocation Processes," to Department of Medical Cell Biology; "Biochemical Characterization of a Mutant in Protein Chain Termination," to the 62nd Annual Meeting of the Federation of American Societies for Experimental Biology, San Francisco.

A.G. Goodridge, "Synthesis and Degradation of Malic Enzyme in Chick Liver," to 62nd Annual Meeting of the Federation of American Societies for Experimental Biology, San Francisco.

A. Kuksis, "Newer Aspects of Bile Metabolism," at the Cornell Medical Center and St. Luke's Hospital Center, New York City.

D.H. MacLennan, "A Current Assessment of the Mitochondrial Structural Protein Concept," to Toronto Biochemical and Biophysical Society Symposium; "Isolation of Components of the Ca++-Transport System of Sarcoplasmic Reticulum," to Department of Biology, Queen's University, Kingston; "The Mitochondrial Inner Membrane," to Department of Pathological Chemistry, University of Toronto; "Components of the Calcium Transport System of Sarcoplasmic Reticulum," to the International Symposium on Malignant Hyperthermia; "The Ca++-Transport ATPase of Sarcoplasmic Reticulum," to the Canadian Biochemical Society Symposium.

S.S. Mookerjea, "Biosynthesis of Plasma Glycolipoproteins," to XIX Colloquium on Protides of the Biological Fluids, Brugge, Belgium; "Mechanism of Choline Action," to Department of Nutrition, University of Toronto; "Catalytic Action of Cytidine-5′-diphosphocholine on Glycoprotein Synthesis," to Canadian Federation of Biological Societies.

F.S. Rolleston, "Significance of Measurements of Concentrations of Intermediary Metabolites," to Johnson Research Foundation, University of Pennsylvania.

B.P. Schimmer, on "Adenyl Cyclase Mutants from Cultured Adrenal Tumor Cells," to Department of Medical Biophysics, University of Toronto; "Adrenal Tumor Cell Mutants with Lesions in Hormone Sensitive Adenyl Cyclase," to Department of Medical Cell Biology, University of Toronto; "Hormone Sensitive Adenyl Cyclase," to Membrane Discussion Group, University of Toronto.

P.T.S. Wong, "Isolation of Components of the Ca++-Transport System of Sarcoplasmic Reticulum," to the American Society of Biological Chemists; "Stimulation of Lactose Transport in a Mutant of *Escherichia coli* by Fatty Acids," to the Canadian Society of Microbiologists.

C.C. Yip, "The Nature of Circulation Proinsulin," to the Toronto Diabetes Association.

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BEHAVIOURAL SCIENCE

Under the direction of Professor R.F. Badgley

That Behavioural Science is integral to medical education has been long accepted; What, how, and by whom the precepts of this field should be taught is evolving by experience. As familiarity with interdisciplinary teaching grows and as relevant research is started, the programme is moving toward the attainment of some of its initial objectives. Now in its third year and a newly minted department, the activities during the past year represent a step in this direction.

TEACHING

With the creative counsel of faculty and students, the dimensions of the curriculum in this system have been more effectively delineated and co-ordinated than in the past. Dialogue with students has resulted in the restructuring of certain classroom sessions and in scheduling smaller teaching sessions. Drawing upon social science concepts for instance, students undertook a variety of projects such as preparing a film dealing with the social and psychological aspects of a patient's illness. Students actively took part in the planning of several sessions ranging from presenting findings obtained from a community health survey (SHOUT) to patterns of drug use (*Vertigo '70*), and on occasion, serving as seminar leaders for specific topics.

Review of the curriculum in conjunction with other systems has served to re-align and integrate specific components of what was being taught with studies given in later years of the medical course. These teaching efforts, still far from being optimally effective, were augmented by a two-day staff retreat. Because no appropriate texts are available, a handbook of selected readings in behavioural science has been assembled.

In addition to the curriculum in Periods IA and IB and the scheduling of several electives, seminars on cognitive development were given to residents in paediatric neurology; participation in grand rounds at the Hospital for Sick Children was initiated; a programme in Behavioural Science in the Faculty of Dentistry begun; and a course on Social and Cultural Factors in Medicine offered in the School of Hygiene.

Cross-appointments with the Departments of Psychology and Sociology have involved the offering of courses to undergraduate and graduate students and the supervision of some Ph.D. candidates in these fields with health-related interests (e.g., on Becoming Mentally Ill, Sociocultural Variations in Illness Behaviour, Hospital Structure and Nursing Turnover).

STAFF

During the year the interdisciplinary staff consisted of two full-time members, five part-time members, and 17 sessional lecturers. Sessional lecturers for 1970–71 upon whose efforts much of the programme turned were:

Richard Allon, Ph.D.
Elizabeth Cape, M.A.
Murray Cathcart, M.D.
Robert Cohen, M.A.
Lawrence Crawford
Richard Isaac, M.D.
Sol Levine, M.D.
John Parker, Nat. Dip. Eng.
Jack Parlow, Ph.D.
Robert Peterson, B.A.Sc.
Peter Ruderman, Ph.D.
Alex Segall, Ph.D.
Martin Shain, M.A., Dip. Crim.
Reginald Smart, Ph.D.
Michael Smith, M.D.
Robert Spasoff, M.D.

With the death of Helen Bridgman Fritz, the Department lost a warm and dedicated friend, one whose humanitarian concern always sought to foster a creative fusion of disciplines. Other staff changes included: Gordon E. Finley, Ph.D., Assistant Professor to Berkeley University; Robert Spasoff, M.D., Sessional Lecturer to Queen's University. Their counsel was thoughtful and incisive.

An Emerging Field

Case studies, position papers, workshops and budding associations are some of the by-products of the emerging discipline of behavioural science and health, a field in which there is as yet little consensus about curriculum or the direction of research activities. Staff members participated in several of these activities, the most relevant including: the editing and contributing to a monograph *Social Science and Health in Canada* (Milbank Memorial Fund, April 1971); participation in the continuing Canadian workshops devoted to the field; membership and holding office in the newly formed Association of Behavioural Science in Medicine; membership on the World Health Organization's Committee on the Sociology of Medical Education; serving as one of six case studies in Behavioural Science and Medicine, an interdisciplinary programme sponsored by the U.S. National Centre for Health Services Research and Development; and participation in symposia on social science and dentistry. These several activities provide a relevant comparative benchmark against which the work of this programme can be gauged.

VISITORS

Professor O.W. Anderson, Center for Health Administration Studies, University of Chicago; Professor S. Bloom, Department of Community Medicine, Mount Sinai School of Medicine; Dr. G. Clarkson, Deputy Minister of Health and Welfare, New Brunswick; Professor F. Davis, University of California Medical Center; Professor J. Elinson, Division of Sociomedical Sciences, Columbia University School of Public Health; Dr. M.R. Elliott, former Deputy Minister of Health, Province of Manitoba; Professor M. Field, Russian Research Center, Harvard University; Professor D.G.

Fish, Faculty of Medicine, University of Manitoba; Dr. G.W. Goldthorpe, Zone Director Medical Services, Sioux Lookout, Ontario; Dr. J. Hamilton, Department of Medicine, McMaster University; Dr. D.J. Hosking, Department of Social and Preventive Medicine, University of Saskatchewan; Dr. K. Paproski, Department of Community Medicine, University of Alberta; Dr. H.R. Robertson, National Science Council; Dr. E. Vayda, Faculty of Medicine, McMaster University; Mr. D.P. Willis, Senior Associate, Milbank Memorial Fund, New York; Dr. S. Wolfe, Department of Family and Community Health, Meharry Medical College.

RESEARCH

Momentum in research has been gaining; it is expected through time that a wider range of investigations relating to the fundamental aspects of human behaviour will be undertaken as well as projects examining the relationship of man, society, and health. Research initiated or in progress during 1970–71 included:

Psychological and Physiological Processes

(1) *Behavioural Effects of Cannabis Sativa*: A parametric investigation in which dose-response relationships between tetrahydrocannabinol and several classical psychophysical tasks are being developed. Naive and experienced users of cannabis (marijuana) will be employed as subjects in the study (L.J. Goldsmith).

(2) *Development of Social Schemata in Children*: An investigation of the age at which children acquire socially defined norms for the structuring of social situations (G.E. Finley).

(3) *Limbic System and Behaviour*: Motivational and cognitive functions of the mammalian limbic system. Effects of selective ablations on emotional behaviour, fluid regulation, and learning (L.J. Goldsmith).

(4) *Neural Mechanisms of Learning and Memory*: Temporal and ordinal relations between behavioural indices of memory consolidation and the physiological mechanisms which may direct or mediate information storage and retrieval. This study deals with: (*a*) Behavioural functions of cerebral RNA and protein synthesis and the effects, on learning and memory, of compounds which stimulate or inhibit these processes; (*b*) The experimental production of anterograde and retrograde amnesia by electroconvulsive shock and drugs (L.J. Goldsmith).

(5) *Sucking for Arbitrary Outcomes in Human Infancy*: This study investigates: (*a*) the visual reactions to focus and non-focus; (*b*) to what extent can the infant gain control over his sucking, which is a relatively stereotyped, reflexive activity used only for the purposes of gaining nutriment and/or comfort; (*c*) the co-ordination of sucking and looking. Further studies will relate to infants' reactions to events that are not contingent upon their behaviour, and their ability to switch from non-contingent to contingent situations (I. Kalnins).

The Community as a Laboratory

(6) *Community Attitudes towards Medical Services*: Undertaken by 12 health science students and part of the activities of the Student Health Organization, University of Toronto (SHOUT), interviews with residents and doctors were obtained in a heavily populated, recent immigrant section of Toronto. Initial findings have been presented to medical classes; the project is continuing throughout 1971 (H.B. Fritz).

(7) *Medical Perspectives on Abortion*: Using a questionnaire, six medical students polled all members of the Ontario College of Family Physicians and are planning to interview doctors in selected communities in the province to determine their attitudes toward abortion (H.B. Fritz and M.J. Kelner).

(8) *The Health of Yorkville*: Designed to study the health problems of young people in Toronto who are not being reached by and/or not availing themselves of traditional health services, the study dealt with the health status of the "hippie" population, as clinically appraised and self-perceived. Funded by the Ontario Department

of Health the final report of this survey of over 500 youths was completed in 1970 (M.J. Kelner).

Health Services and Social Policy

(9) *Health Manpower: Concepts and Methods*: An extensive review of concepts and methods used in health manpower studies was the basis for a World Health Organization Scientific Group on the Development of Studies in Health Manpower (R.F. Badgley).

(10) *Sioux Lookout Project II. Delivery of Health Care*: In conjunction with the Departments of Paediatrics and Anthropology and supported by a National Health Grant, a study of perceived health needs, the utilization of health services and the structure of health care is being undertaken in a 200,000 square mile area in northwestern Ontario. Working in collaboration with the staff of the Medical Services Branch (Dr. Kenneth Butler and Dr. Gary Goldthorpe), a research team consisting of a medical student, a dentist, a nurse, an anthropologist, and two sociologists has undertaken initial field work on this five-year project (R.F. Badgley and D. Mackenzie).

(11) *Canadian Experience with Universal Health Insurance*: Through support from the U.S. National Center for Health Services Research and Development, a three-year study examining Canada's experience with universal health insurance was initiated with Professor Odin W. Anderson, Center for Health Administration Studies, University of Chicago. The object of this study is to document emerging trends in the provision and organization of health services in this nation with a view to comparing this experience with developments elsewhere, particularly dealing with operational problems which may have relevance for the United States (R.F. Badgley, O.W. Anderson and G. Torrance).

(12) *The Family Doctor: 1960–2000*: With Dr. Samuel Wolfe, Meharry Medical College, this book to be published by Aldine-Atherton Press in 1971, deals with a longitudinal analysis (1962–8) of the work of a Canadian group of doctors focusing *inter alia* on: the doctor's work load, the fees derived, the time spent, prescribing habits, the medical conditions seen, the use of hospitals, findings on check-ups, the extent of preventive services, house calls, and referral patterns. Analyses have also dealt with the relationships between the social characteristics and the patterns of visits by patients and their families. The extent to which a family doctor looks after families is analysed, as well as which individuals use the services of a particular group of doctors and other services (S. Wolfe and R.F. Badgley).

HONOURS

R.F. Badgley, Consultant, Scientific Group on the Development of Studies in Health Manpower, World Health Organization, 1970– ; Member, Sociology of Medical Education, World Health Organization, 1969– ; Chairman, Committee on International Medical Sociology, American Sociological Association; Associate Editor, *Journal of Health and Social Behaviour*; Associate Editor, *Medical Care*.

K.G. Ferguson, Chairman, Ethics Committee, Ontario Psychological Association.

SCHOLARLY ADDRESSES

R.F. Badgley, "Medical Power in Health Manpower," International Sociological Association, Varna, Bulgaria, September 15, 1970.

R. Cohen and R.F. Badgley, "Dilemma in Innovation: The Medical Assistant's Role," National Conference on Assistance to the Physician, Ottawa: April 6–8, 1971.

G. Finley, "Egocentricism and the development of persuasive skills," Biennial Meetings of the Society for Research in Child Development, Minneapolis, April 1, 1971.

M.J. Kelner, "New Techniques for Research in the Health Field: The Role of

Action Research," Conference on Social Sciences and Medicine, Aberdeen, September 1970; with E. LATOWSKY, "Youth: A New Tribal Group," American Association of Anthropology, San Diego, November 1970; "Drug Users as People: Some Reflections on Youthful Drug Use," Canadian Learned Societies, St. John's, June 6–9, 1971.

PUBLICATIONS

BADGLEY, R.F. "Group Medical Practice: A Sociological Perspective"; in *New Horizons in Health Care*, pp. 163–70. Winnipeg, 1970.
——— *Health Manpower: Concepts and Methods.* Geneva: World Health Organization, 1970, CHS/WP/70.2. Pp. 35.
——— "Health Manpower Education"; in *Proceedings of National Health Manpower Conference*, pp. 195–7. Ottawa: Queen's Printer, 1970.
——— (ed.) "Social Science and Health in Canada" (*Milbank Memorial Fund Quarterly*, vol. 49, April 1971).
——— "The Sociology of Health: Some Questions" (*ibid.*, pp. 133–57).
——— "Studies in Planning Health Manpower: The Varna Meeting" (*Journal of Health and Social Behaviour*, vol. 12, March 1971, pp. 4–10).
——— Reviews, *Journal of Health and Social Behavior*, vol. 12, March 1971, p. 89; *Social Science and Medicine*, vol. 4, 1970, pp. 691–3.
BADGLEY, R.F., BLOOM, S., MECHANIC, D., PEARSON, J. and WOLFE, S. "International Studies of Health Manpower" (*Medical Care*, vol. 9, 1971, pp. 235–52).
BADGLEY, R.F., COATES, D.B. and SONE, K.J. "Selected Bibliography on Social Science and Health in Canada" (*Milbank Memorial Fund Quarterly*, vol. 49, 1971, pp. 277–314).
FERGUSON, K.G. "In the Name of Health" (*Canada's Mental Health*, vol. 38, 1970, pp. 21–6).
KEMPER, T.D., FRITZ, H.B. and KELNER, M.J. "Social Science in Schools of Medicine: Problems, Prospects and a Program" (*Milbank Memorial Fund Quarterly*, vol. 49, 1971, pp. 244–73).
——— "Social Science in a School of Medicine: The University of Toronto Programme"; in *The Teaching of Social and Behavioural Sciences in Canadian Medical Schools in 1970*, by D.G. Fish and D.E. Larsen, pp. 42–8. Winnipeg, 1971.

BIOCHEMISTRY

Under the direction of Professor G.R. Williams

The following numbers of students were registered in courses given by the Department of Biochemistry:

Faculty of Medicine (first professional year)			175
Faculty of Dentistry (first professional year)			82
Faculty of Arts and Science	BCH 320		244
	BCH 321		36
	BCH 321 (summer 1970)		52
	BCH 421, 422, 423, 424		98
Faculty of Food Sciences			21
School of Graduate Studies			
(*a*) Major Subject Biochemistry			66
Candidates for Ph.D.		48	
Candidates for M.Sc.		18	
(*b*) For other Departments			
Graduate Students and Special Students			60
(*c*) Postdoctoral Fellows			8
	TOTAL		842

Among the graduate students majoring in Biochemistry, 4 held Fellowships of the Medical Research Council, 18 held studentships of the Medical Research Council, 10 held Province of Ontario Graduate Fellowships, and 4 held Fellowships of the University of Toronto. Thirty graduate students were granted Teaching Fellowships by the Department.

The following students registered in the Department of Biochemistry, completed work, and presented theses for graduate degrees as follows:

Ph.D. degree
ADAMSON, E.D.
"The Purification and Characterization of γ-Glutamyl Cyclotransferase"
AMBUS, T.
"Lactate Uptake and Ion Movement"
ARCHER, M.C.
"Mechanisms in the Oxidation of Reduced Pteridines"
BEATTY, B.
"Studies of the Biosynthesis of Ribosomal Proteins in *E. coli*"
BENNICK, A.
"Purification and Partial Characterization of Four Proteins from Human Parotid Saliva"
DAVIS, N.R.
"Desmosine and Isodesmosine Crosslinks of Elastin"
FORSTNER, J.F.
"Calcium Binding to Erythrocyte Membranes"
KEOUGH, K.M.W.
"Studies of Phosphoinositide Phosphodiesterase in Brain"
LEWIS, A.F.
"Structural Studies of an Atypical Immunoglobulin"
NAZAR, R.N.
"Regulation of Macromolecular Synthetheses During Inhibitor-Induced Shift-Downs"
PERRY, G.L.
"Interaction of Cytochrome b in the Mammalian Respiratory Chain"
RIORDAN, J.R.
"Enzyme Activity at the Surface of Muscle Cells"

M.Sc. degree
CHEEMA, P.
"Studies on the Gangliosides of Murine Liver"
HARTMAN, M.K.
"The Type A Cytochrome of Bacillus subtilis"
JABBAL, I.
"Glycosyltransferases of Mammalian Liver"
LUKOWSKY, W.
"Isoelectric Focusing of Erythropoietin"
MAINS, G.
"Studies on the Specificity of Penicillopepsin"
OAKDEN, K.
"A Study of Physical Heterodispersity in Preparations of Plant Ribonucleates"
SWENSEN, M.M.
"Fractionation of Seromucoid in Rat Plasma"
WONG, R.
"Choline Oxidation and Labile Methyl Groups in the Normal and Choline-Deficient Rat Liver"

RESEARCH

In Professor Anwar's laboratory, Dr. G. Kemp and Mr. G. Gerber have continued their work on the structure of elastin. It has been established that during periodate-permanganate oxidation (a technique developed for the cleavage of pyridinium ring of desmosine and isodesmosine) tyrosine is quantitatively converted to aspartic acid and that a chemical modification of tyrosine protects it from oxidation. Mr. R. Zemell has shown that pyruvate-UDP-Glc NAc-transferase is inhibited by UDP-MurNAc-tripeptide (isolated from oxamycin inhibited *B. cereus* by H. Takeda). This suggests feedback control mechanism. Mr. A. Taku is engaged in further purification of UDP-GlcNAc-pyruvate reductase.

Professor Camerman's research has been focused on the determination of the molecular basis for anticonvulsant drug action. In collaboration with Dr. A. Camerman of the University of Washington, he elucidated the three-dimensional structures of diphenylhydantoin, diazepam, and procyclidine, three chemically different anticonvulsants shown to have activity against grand mal epilepsy, and found certain stereochemical similarities in their structures which he has been able to postulate are the factors responsible for their anticonvulsant action. In addition, he has initiated

work on the molecular biology of thyroid hormone action. Thyronine, triiodothyronine, and thyroxine have been crystallized, and their structures are being elucidated in order to determine conformational features responsible for their diversity of activities.

In Professor Connell's laboratory, Miss Parr initiated structural studies on human cryoglobulins, Mrs. Buchwald continued her investigation of immunoglobulins containing free sulfhydryl groups, and Mrs. Percy completed the structural analysis of IgG(Sac), a human immunoglobulin with deletions in both light and heavy chains. Dr. A. Bennick and Dr. E. Adamson completed their Ph.D. theses on the proteins of partoid saliva and on γ-glutamyl cyclase respectively.

Professor K.J. Dorrington is studying (*a*) the geometry of the hapten-binding site of anti-nitrophenyl antibodies, using the induced optical activity of the bound hapten; (*b*) the structure and conformation of immunoglobulin E; (*c*) the role of disulphide bridges in stabilizing the tertiary structures of immunoglobulin A; and (*d*) the role of subunit interaction in the biological function and conformation of immunoglobulins. Dr. B.R. Smith and Mr. J. Ellerson are attempting to delineate the relative importance of the constant and variable sequence regions of immunoglobulin subunits in maintaining the structural and functional integrity of the molecule.

In Dr. J. Manery Fisher's laboratory the study of the external membranes of muscle fibres and erythrocytes has continued. With Dr. I.H. Chaudry, Mr. S. Madapallimattam, and Mrs. J. Kornblatt it was shown that the plasma membrane and sarcoplasmic reticulum of muscle could be distinguished by (*a*) their Ca^{2+} binding properties, (*b*) nucleotide specificity, pH optima and Ca^{2+} and Mg^{2+} modification of their ATPases. In collaboration with Mr. L. Pinteric, using the electron microscope, and Dr. C. Hsai, using a spin label technique. Dr. Chaudry has observed that EDTA and Ca^{2+} ions produce morphological and conformational changes in erythrocyte membrane components. By testing Ca^{2+} binding to erythrocyte membranes after blocking amino and sulfhydryl groups, Dr. J.F. Forstner has further evidence that carboxyl groups provide the major Ca^{2+} binding sites.

From kinetic studies Mrs. E.E. Dryden has shown that lactate isomers enter muscle by facilitated rather than by free diffusion. Mr. Yintak Woo is studying the enzymes (ATPase, adenyl cyclase, phosphodiesterase) situated on the external surface of isolated skeletal muscle.

The main effort in Dr. Hofmann's laboratory has been directed towards determining the amino acid sequences of penicillopepsin. During the past year some 260 residues out of the 310 residues in the protein have been accounted for in peptide sequences ranging from 4 to 28 residues long. This has been possible through the efforts of Mr. Kurosky who has sequenced a large number of peptides from a chymotryptic digest, Dr. Harris who worked on a tryptic digest, and Mrs. Rao who has isolated peptides from a thermolytic digest. The sequences obtained so far confirm that penicillopepsin is homologous to porcine pepsin and shares an evolutionary ancestor with protein. Another acid proteinase from *Rhizopus chinensis* appears to be homologous also as preliminary sequence work and inhibition studies carried out by Dr. Sodek and Mr. Graham shows. Dr. Takahashi and Mr. Mains have completed a study of the specificity of penicillopepsin which shows extensive similarities with the specificities with many other acid proteinases including pepsin, and the milk clotting enzyme chymosin from calf stomachs. During these studies Dr. Takahashi also discovered an interesting transpeptidation reaction which for the first time shows conclusive evidence of the involvement of an acyl intermediate in the hydrolytic mechanism of pepsin-like enzymes. Miss Wasi has continued her studies on the conformational changes of elastase, using a chemical reactivity of selected side chains as a probe. She has also completed a study on temperature controlled conformational changes in α-chymotrypsin. These studies prove conclusively the usefulness of chemical reactivity as powerful tools in studies of conformational changes in proteins. Mr. Jones has isolated and obtained in homogeneous form penicillocarboxypeptidase, which appears to be a unique enzyme as shown by specific inhibition studies. No proteolytic enzyme showing similar inhibition characteristics has been described in the

literature. Mr. Graham and Mr. Kurosky have also completed a study of the effect of ionic strength on the structure of α-chymotrypsin. Dr. Hofmann is collaborating with Dr. Dorrington on a study of the environmental effect, such as ionic strength and pH on the circular dichroic spectra of α-chymotrypsin. Finally, the work on the X-ray analysis of penicillopepsin is progressing. In collaboration with Dr. Nyburg, Mr. Dalziel, Miss Dangelat, and Mrs. Hui completed the writing and debugging of the large complex programmes necessary to an evaluation of the reflections obtained on X-ray analysis of the enzyme. Isomorphous derivatives have been prepared and are presently being analysed.

In the laboratory of Professor E.R.M. Kay work is in progress on aspects of tumour metabolism. Mrs. I. Gower, who joined the laboratory in October 1969, has been studying the effects of various histone fractions on nuclear metabolism of the Ehrlich ascites carcinoma. Dr. N. Islam has devoted much of his time to the study of the metabolism of nucleotide-peptides, which he has discovered to be present in tumour cells. Concurrently with this work Dr. Islam has developed a new procedure for the preparation of soluble RNA, and has studied the effects of Vinblastine in tumour cells. Mr. H. Pushie has continued his studies of tumour cell nuclear RNA using sucrose gradient centrifugation and gel electrophoresis studies.

In the laboratory of Professor B.G. Lane Miss Theresa Tumaitis has completed her study of the biogenesis of 5-carboxymethyluridine methyl ester. Miss Kathleen Olver has made progress in her attempts to characterize the terminal nucleoside residues of the high molecular weight ribonucleates from yeast cells. Mr. Tai Kwong has characterized 2-thio-5-carboxymethyluridylate, and its methyl ester which are derived from yeast transfer RNA. Mr. Raymond Lau has studied the sequence distribution of $O^{2'}$-methylribose in each of the 16S and 28S components of yeast ribosomal RNA. Mrs. Patricia Bronskill has provided skilful assistance to Miss Tumaitis and Mr. T.C. Kwong.

The work in Professor Murray's laboratory is centred around biochemical aspects of the cytoplasmic membranes of normal and malignant cells using two principal systems – murine liver and cells grown in tissue culture. Mr. Bailey is investigating the proteins of microsomal fractions of rat liver and several hepatomas. Mr. Chatterjee and Mr. Yogeeswaran are studying certain aspects of the biochemistry of the neutral glycolipids and gangliosides of a variety of cultured mammalian cells.

In Professor Packham's laboratory, further studies of blood platelets have been carried out with the co-operation of Miss Maria Guccione, Dr. Charles Jenkins and Mrs. Puay Lim Chang. At the platelet membrane, C^{14}-ADP has been found to be converted mainly to C^{14}-ATP in suspension of washed platelets from rabbits. The enzyme responsible for this conversion has been identified as nucleoside diphosphokinase and some of its properties have been investigated. Release of ATP from platelets upon stimulation with ADP has been demonstrated. The effects of polylysine on platelets have been studied, and the observations of the adherence of platelets to surfaces has been extended.

Work in Professor R.H. Painter's laboratory has been concentrated on developing methods by which immunoglobulin heterogeneity may be resolved. In collaboration with Dr. M.H. Freedman the technique of preparative isoelectric focusing has been used for the further resolution of specifically purified antihapten antibodies. The combination of procedures has allowed the preparation of antihapten antibodies which are both functionally and structurally homogeneous. Mr. J.O. Minta, working in Professor Painter's laboratory has demonstrated the ability of c-terminal fragments of human immunoglobulin G to participate in the passive cutaneous anaphylaxis reaction. In collaboration with Dr. Nyburg and Mr. L. Pinteric some studies have been undertaken on the ultrastructure of the Fc fragment as revealed by X-ray diffraction analysis and the electron microscope. Mr. W. Lukowsky is completing studies on the composition of the carbohydrate in the hormone, erythropoietin, and on the role which sialic acid plays in the biological activity of this hormone.

In Mr. Pinteric's laboratory further investigations were carried out on the ultra-

structure of immunoglobulins and their fragments as seen in the electron microscope.

Supporting morphological evidence was provided on perforations of biological membranes and cell fragments such as Golgi apparatus, plasma membrane, mitochondrion, etc. for Drs. Fisher, Schachter, Murray, Williams, and Thompson. The factors which affect the structure of phospholipid liquid crystals in aqueous systems were studied with Dr. Tinker.

The effect of histidine on the morphology of *E. coli* was studied in co-operation with Dr. Wong.

The study on insulin location in the isolated muscle using autoradiography on the electron microscopic level and the study on the effect of various methods on the morphology of the red cell ghost is in progress with the co-operation of Dr. Fisher. To make possible a study of cryoglobulins and induce their crystallization, a device was designed and constructed to control the temperature of a simple drop of material within 0.1°C. A design and construction of a computer to facilitate the measurements on photomicrographs is in progress.

In Professor Schachter's laboratory, several problems in the area of glycoprotein metabolism have been pursued. Mr. R.L. Hudgin has studied the properties of sialyl-, galactosyl-, and N-acetylglucosaminyltransferases in pork liver. He has also discovered the presence of these three enzymes in human and pork serum. Mr. Hudgin is at present studying the induction of sialyltransferases in the foetal livers of humans, pigs, rats, and calves. Mr. Raymond Yuen is completing his work on the purification of a newly discovered enzyme in the catabolism of L-fucose in mammalian liver, namely, L-fuconate dehydratase. Miss Ngozi Nwokoro is working on the next enzyme in this pathway of L-fucose degradation, namely, an NAD-dependent enzyme which converts the product of L-fuconate dehydratase, 2-keto-3-deoxy-L-fuconate, to an as yet unidentified product. Miss Nwokoro has partially purified her enzyme and is also attempting to identify the product of the reaction. Miss Pamela Letts is completing work on an N-acetylglucosaminyltransferase present in the rough endoplasmic reticulum of rat liver and has begun a new project on the induction of various glycosyltransferases during the process of spermatogenesis in mouse testis; the latter project is being carried out in collaboration with Drs. M. Meistrich and W.R. Bruce of the Department of Medical Biophysics. Dr. Schachter, with the help of various summer and part-time students, is also collaborating with Dr. R. Sheinin of the Department of Medical Biophysics on glycoprotein synthesis in normal and transformed cultured cells, and with Mrs. M. Crookston of the Toronto General Hospital Blood Bank on the presence of blood group-specific glycosyltransferases in human serum.

During the sabbatical leave of Dr. G.E. Connell, Dr. Schachter has been supervising the work of one of Dr. Connell's students, Mr. Fred Ofosu. Mr. Ofosu has used highly purified bacterial glycosidases to remove sequentially sialic acid, galactose and N-acetylglucosamine residues from human serum haptoglobin; he has studied the properties of these modified proteins with particular reference to their abilities to bind haemoglobin.

Research in Professor Scrimgeour's laboratory has been directed to an examination of the chemical and enzymatic properties of folic acid coenzymes and pteridines, and the study of the mechanisms of enzyme reactions involving several nucleotide transformations.

The structure and enzymatic reactivities of the unstable quinonoid diyhydropteridine compounds has been extensively studied by Dr. M.C. Archer and Miss Surinder Cheema. Miss Diana Chippel has succeeded in characterizing the pathways for the degradation of the co-enzymes tetrahydrofolic acid and dihydrofolic acid. Mr. Mutsufumi Kawai has examined the reduction of folic acid and dihydrofolic acid by a variety of chemical agents, including dithionite, titanium trichloride, and viologen dyes. All of these studies on the oxidation and reduction reactions of these vitamin derivatives aid in the elucidation of biochemical processes requiring the pteridine coenzymes.

Mr. Alan Dennis and Mr. Tai-Wing Wu are examining the enzyme GMP reduc-

tase and IMP dehydrogenase. Both of these enzymes are necessary for the interconversion of the primary purine nucleotides inosinic acid and guanylic acid, necessary precursors of both co-enzymes and nucleic acids. IMP dehydrogenase has been clearly established as a "control" or "Allosteric" enzyme in bacteria, but the GMP reductase – long thought to be a control step – does not appear to have this function.

Professor Thompson, with the assistance of Miss Roberta Wong, Mr. Roy Baker, Mr. Kevin Keough, Mr. Joel Parkes, and Mr. Gordon MacDonald, is continuing studies in three areas of lipid metabolism (*a*) metabolism *o*f phosphoinositides in the central nervous system, with particular emphasis on the positional distribution and turnover of fatty acids in the phosphoinositides and the purification and properties of enzymes hydrolyzing inositol lipids; (*b*) the composition and synthesis of phospholipids in inner and outer mitochondrial membranes; (*c*) the primary events in liver metabolism associated with fatty infiltration of liver in the choline-deficient animal.

In the laboratory of Professor D.O. Tinker, studies of the physics and chemistry of complex lipids and lipolytic enzymes are in progress. Mr. David Purdon has utilized spin-labelled probes to study the molecular orientation and movement in phospholipid particles, and is correlating these data with the rates of attack of phospholipase A upon these particles. Mr. Michael Wills, in collaboration with Mr. L. Pinteric, has continued electron microscopic studies of the morphology of phospholipid dispersions, and has also carried out light-scattering measurements on the dispersions. Professor Tinker has calculated the light-scattering behaviour of several models of the phospholipid particles, and the theoretical predictions have been utilized to deduce the structure of the particles produced experimentally. In collaboration with Professor D.H. Osmond, Department of Physiology, Professor Tinker has carried out chemical characterization of an unusual phospholipid found in dog kidney, which proved to be lysophosphatidyl ethanolamine. The reported renin-inhibitory properties of this lipid were tested *in vivo* and *in vitro* and found to be absent; however, other phospholipids including phosphatidyl ethanolamine and phosphatidyl serine did inhibit the action of rennin. This phenomenon may be physiologically important.

In Professor Williams' laboratory, Dr. B.H. Robinson has been investigating the carrier system responsible for the movement of dicarboxylate and tricarboxylate anions across the mitochondrial membrane; Mr. Hugh Lawford has been studying the analogous system in Pseudomonads. Dr. G.S. Wong has been studying the functional relationship of these systems to integrated oxidations in mitochondria isolated from rat heart; Dr. M.F. Phillips has been examining this problem in plant mitochondria. Miss Jeanne Orr has been investigating the relationship of anion movement to the control of metabolism. Dr. I. Zamudio, Dr. J. Kornblatt, and Professor Williams have extended their studies on the structure and function of cytochrome oxidase from both mammalian and bacterial sources.

In the laboratory of Dr. J.T. Wong, Mrs. Barbara Beatty has analysed the syntheses of ribosomal proteins in *Escherichia coli* in response to inhibition of RNA synthesis and this enquiry had led to the distinction between "early" and "late" biosynthetic classes of ribosomal proteins. Mrs. Pincock and Mrs. Bronskill have studied the carrier kinetics of β-galactoside transport in *Escherichia coli* and concluded that energy coupling occurred at the intracellular dissociation of the substrate-carrier complex. In collaboration with Dr. C.S. Hanes and Dr. L. Endrenyi, experiments on the kinetics and mechanism of liver alcohol dehydrogenase reaction continue.

HONOURS

The Ayerst Award of the Canadian Biochemical Society for 1971 has been granted to Dr. Byron George Lane. Dr. Lane's lecture was entitled "The study of trace components as an approach to the characterization of cellular ribonucleates."

Dr. G.R. Williams was named President of the Canadian Biochemical Society for 1971 at the June Annual Meeting.

SCHOLARLY ADDRESSES

I.H. CHAUDRY, J.F. MANERY, and G. MADAPALLIMATTAM, "Distinction between plasma membrane and sarcoplasmic reticulum by Ca uptake," 13th Annual Meeting of the Canadian Federation of Biological Societies, Toronto, June 1970.

I.H. CHAUDRY, "The role of insulin ATP and divalent cations in glucose utilization by muscle," Department of Surgery, the Jewish Hospital and Washington University, St. Louis, Missouri, June 1971.

K.J. DORRINGTON, B.R. SMITH, and J. ELLERSON, "Circular dichroism of Immunoglobulin G and its subunits, Canadian Federation of Biological Societies, Toronto, June 1971.

J.F. FORSTNER and J.F. MANERY, "Calcium binding to red cell membranes," Spring Meeting of the Red Cell Club, Chicago, April 1971.

T. HOFMANN, "Evolution of Zymogens and their activation," State University of New York, Buffalo, October 1970 and University of Western Ontario, December 1970.

J.F. MANERY, "Distinction between the ATPase bound at the fibre surface and the PM and SR ATPases of muscle," Department of Pharmacology, University of Virginia, Charlottesville, Virginia, April 1971.

J.O. MINTA and R.H. PAINTER, "Evidence for a skin fixation site in the C-terminal domain of Fc," Canadian Federation of Biological Societies, June 1971.

R.H. PAINTER, "Some properties of sheep plasma erythropoietin," American Society of Hematology, XIIIth Annual Meeting, 1970.

R.H. PAINTER and M.H. FREEDMAN, "The isoelectric properties of specifically purified rabbit antibodies directed against several different haptens," Federation of American Societies for Experimental Biology, Chicago, 1971.

J.H. ROCKEY, P.C. MONTGOMERY, and K.J. DORRINGTON, "Induced optical activity of antibody-hapten complexes," Federation of American Societies for Experimental Biology, April 1971.

K.G. SCRIMGEOUR, "Oxidation-reducing reactions of pteridine coenzymes," CIC-ACS Joint Meeting, Toronto, May 28, 1970; "Teaching Biochemistry in high school," Canadian Association of Science Teachers Conference, Toronto, November 1970; "Quinonoid dihydropterin reductase," Conference on Folate Antagonists," New York Academy of Sciences, New York City, January 11, 1971; "Control of the interconversion of purine nucleotides," University of Vermont, Burlington, Vermont, March 26, 1971.

D.O. TINKER, "Determinants of structure in artificial and natural lipid membrane systems," Symposium on Solid State Physics and the Biological Sciences, Dalhousie University, June 28–30, 1971; "Phenomenology and mechanisms of solute transport in real and model biological membranes," Symposium on Solid State Physics and the Biological Sciences, Dalhousie University, June 29–30, 1971.

G.R. WILLIAMS, "Inhibitors of mitochondrial anion transport," 8th International Congress of Biochemistry, Luzern, Switzerland, September 1970; "Anion transport across biological membranes," Department of Biochemistry, Memorial University, St. John's, Newfoundland, April 1971; "Anion transport and the regulation of the citric acid cycle," Symposium on Metabolic Regulation, University of Nebraska, Omaha, Nebraska, May 1971; "Tricarboxylate transport in *Pseudomonas fluorescens*," International Symposium on The Biochemistry and Biophysics of Mitochondrial Membranes, Bressanone, Italy, June 1971; "Inhibition of tricarboxylate exchanges – *Pseudomonas fluorescens*," 14th Annual Meeting of the Canadian Federation of Biological Societies, Toronto, June 1971.

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INSTITUTE OF BIO-MEDICAL ELECTRONICS

Under the direction of Professor N.F. Moody

The Institute, founded in 1962, is now approaching the end of its first decade, and it has maintained the steady pace of accomplishments described in earlier President's Reports. It seems particularly significant to us that our function and aims are acknowledged by the many universities and groups in Canada now following our example: no fewer than 16 universities are now either undertaking some research in the field of bioengineering or have set up Departments or Institutes of their own. It has been said by the President of the Canadian Medical and Biological Engineering Society that: "The presence of a biomedical engineering nucleus at the university has proven helpful to graduate training in traditional medical or biological disciplines, e.g. physiology or pharmacology. Biomedical engineers, with or without the collaboration of their biomedical colleagues, are usually well qualified to organize such courses as biomathematics or use of mathematics in biology, control system theory as applied to biological systems, information theory, use of computers in biology, biomedical instrumentation, etc." (from a survey of biomedical engineering, published by CMBES); and the Institute finds itself with ever-increasing frequency called upon to counsel and guide its colleagues in other disciplines. We also note with pleasure that the Canadian Medical Research Council has singled out biomedical engineering as a key area for increased financial support (*Medical Research Council Support for Research Trainees*, MRC, November 1970).

Certain of our researches have led to instruments which have been patented and are suitable for commercial manufacture. In an effort to create a medical electronics industry in Canada, we have co-hosted a seminar with the Department of Trade and Development of this Province, which was attended by some 60 manufacturers. Great interest was shown. A number of these companies have since sought our advice, and we understand that two of them have now launched a medical engineering venture.

We were fortunate in having as a distinguished guest and visiting Professor Dr. B. Sayers of the Engineering in Medicine Laboratory of Imperial College of Science and Technology in England. His broad experience provided a stimulus to both staff and students which will be felt for some time to come.

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FAMILY AND COMMUNITY MEDICINE

Under the direction of Professor F.B. Fallis

The Department has continued to pursue its short-term objectives: (1) the definition of curriculum in "Family and Community Medicine"; (2) our responsibilities in the undergraduate curriculum; (3) the development of the Family Practice Residency Programme; and (4) attention to community needs by the establishment and study of new service models and methods of health care delivery.

A general Departmental Workshop with colleagues from other departments of the Faculty met in November 1970. As a result, ten committees have been studying curriculum from the departmental point of view. These committees and chairmen are as follows: Surgical Studies, Dr. Reg Perkin; Growth, Dr. Nathan Levinne; Reproduction, Dr. Yvonne de Buda; Medical Studies, Dr. Lorne Laing; Psychiatry and Behaviour, Dr. Earl Dunn; Prevention and Rehabilitation, Dr. Douglas Johnson; Personal and Family Dynamics, Dr. John Hilditch; Practice, Dr. Evan Monkman; Learning and Research, Dr. David Lawee; and Community Service, Dr. Donald Butt. These committees have presented preliminary reports and are acting as advisers to the members of our teaching staff responsible for planning content at each stage of the undergraduate and postgraduate curriculum. Our responsibilities in the undergraduate programme have continued to be concentrated in Period III, during which every clinical clerk has had the opportunity to study ambulatory patients for fifteen half-days on a consecutive weekly basis under the direction of the Department of Family and Community Medicine. Further thought has been given to a departmental contribution in Period II. Co-operation has continued with the Department of Behavioural Science in Period I. Specific suggestions were made by Dr. Paul Roberts and committee regarding the teaching of Geriatrics. There has been continuing co-operation with the Department of Preventive Medicine. Dr. Douglas Johnson has acted as Departmental Co-ordinator for Period III, Dr. Murray Cathcart for Periods I and II, and Dr. Yvonne de Buda for Electives.

The first full year of the Family Practice Residency Programme has been successfully completed for 24 first-year and 6 second-year residents. Next year there will be 29 first-year and 26 second-year residents. This programme is hospital based with a series of clinical attachments with graded responsibility, involving an additional two months block of time annually and two half-days a week throughout the year spent in the Department of Family and Community Medicine. The Residency Programme has leaned heavily on assistance from other departments in the Faculty.

Dr. Reg Perkin has acted as Co-ordinator of the Residency Programme.

The Department has co-operated in a number of programmes with the Division of Postgraduate Medical Education, in particular in the series of monthly Saturday Clinical Sessions for Family Physicians provided by Sunnybrook Hospital.

Dr. Douglas Johnson has acted as Co-ordinator of the Continuing Education Programme.

The assessment and study of clinical needs in the community has so far been concentrated on the 35 Teaching Practices in the Department registered with the Ontario College of Physicians and Surgeons. The College has extended to students in these Practices the benefits of the Educational Register. The Department has also been active in the operation or establishment of several new and proposed community health centres, in particular the Gerrard-Broadview Clinic of St. Michael's Hospital.

Dr. Evan Monkman has served as staff adviser to the SHOUT Clinic, the student-sponsored community health centre.

A number of programmes over the year pointed toward close liaison with Nursing in studying the community health team. Members of the department took part in the Pilot Project for Nurse-Practitioners at McMaster University.

Dr. Murray Cathcart became Chief of the Department of Family and Community Medicine at St. Michael's Hospital, beginning July 1, 1970. Dr. Rory Fisher has been appointed full-time Chief of Chronic and Domiciliary Care at Sunnybrook Hospital. Dr. Robert Angus and Dr. Peter Hopkins have joined the full-time staff at the Toronto Western Hospital, and Dr. Ruth Sky at the Toronto General Hospital. Dr. Ruth Sky spent two weeks in Brazil working as a visiting physician under the auspices of the Scarborough Foreign Medical Society.

A detailed account of Family Practice Operations related to the University of Toronto was prepared at the request of the Research and Planning Branch of the Department of Health. An application for approval of the Family Practice Residency Programme was prepared by Drs. Cathcart and Perkin for the College of Family Physicians of Canada.

RESEARCH

St. Michael's Hospital

Dr. Murray Cathcart and staff have had approved a substantial grant by the J.P. Bickell Foundation for the teaching and practice of Family Medicine.

Toronto General Hospital

The staff provided the studies for DM 28, the St. George Health Centre. This grant has been awarded to the University to study certain aspects of community health delivery (Ontario Department of Health).

Sunnybrook Hospital

"Community Health Attitude Survey" by Drs. Le Riche, Hilditch, and Demanuele, was published in June 1971. "Nurse-Doctor Shared Care Programme of the Chronically Ill," was a demonstration project to assess community care of the chronically ill when shared by the public health nurse and physician.

Toronto Western Hospital

"The Study of the Role of the Community Health Nurse in a Family Practice Unit," an on-going research project, is attempting to determine the feasibility of certain additional roles for the nurse in a Family Practice Unit.

Dr. Peter Hopkins has acted as Co-ordinator of Research.

HONOURS

DR. HOLLISTER KING is Chairman of the Board, Ontario Chapter, College of Family Physicians of Canada.

SCHOLARLY ADDRESSES

F.B. Fallis, "Roles in Community Health," Canadian Nursing Association, 1970; "The Doctor's Dilemma," National Workshop on the Family Practice Nurse, Toronto 1971.

D. Lawee, "The Quality of the Clinical Use of Medical Laboratory Data," University of Kansas Medical Centre, Kansas City, November 1970.

R.L. Perkin, "Cancer Therapy," Ontario Medical Association, 1971, "Medical Education," Peterborough Medical Centre, 1971.

J.E. Aldis, "Prepaid Health Insurance and Health Care Delivery," Homecoming Medical Conference, University of Western Ontario, London, October 1970.

PUBLICATIONS

Fallis, F.B. "Metro G.P.'s – Where, Who, How Many" (*Canadian Family Physician*, vol. 17, Feb. 1971, p. 33).

Fallis, F.B., King, H.F., Perkin, R.L. *et al. Report of the Subcommittee on Community Health Care* to the Ontario Council of Health, Toronto, 1971.

Glick, D. "Hypnosis and the Art of Family Medicine" (*Canadian Family Physician*, vol. 17, Dec. 1970, pp. 93–104).

——— "An Isolated Case of Mumps in a Geriatric Population" (*Journal of the American Geriatrics Society*, vol. 18, 1970, pp. 643–4).

Lawee, D. "Clinician's Response to Unsolicited Data: An Evaluation of 1,000 Serum Calcium and Inorganic Phosphate Determinations" (*Canadian Family Physician*, vol. 16, 1970, pp. 57–60).

——— "Pheochromocytoma Associated with Pregnancy" (*Canadian Medical Association Journal*, vol. 103, 1970, pp. 1185–7).

Le Riche, H., Demanuele, F. and Hilditch, J. *Health Attitude Survey*. Toronto: University of Toronto Press, 1971.

Perkin, R.L. "Prototype Preceptorships" (*Canadian Family Physician*, vol. 16, 1970, pp. 65–9).

MEDICAL BIOPHYSICS

Under the direction of Professor H.E. Johns

This is the tenth and last report on the activities of the Department of Medical Biophysics which I will present. Next year the department will be under the able direction of Professor G.F. Whitmore. I would like to take this opportunity to thank the staff of the department for the single-minded devotion to excellence which they have shown in their dealings with students and staff alike.

As Head of the Department I have seen the graduate aspects of the Department grow until we now have some 60 graduate students. Our students have been in demand as postdoctoral students in internationally known centres, and have taken permanent positions in research centres and academic departments in Canada and elsewhere. To date, we have not had trouble placing our students, but this situation may arise in the future. In order to meet this potential threat, we have continued to raise our standards with more students having their graduate studies terminated early in their graduate enrolment. The main criteria for success of a student in our department depend upon his ability to carry out independent research. We have emphasized education at the graduate and postgraduate levels and expect to continue to do this since we believe it is needed in the Faculty of Medicine.

The last ten years have seen groups in Medical Biophysics established at the Toronto General Hospital and the Hospital for Sick Children. I see this trend continuing with larger groups of Biophysicists in these and other hospitals. The need for the incisive tools of biophysics in the medical field will continue to expand.

RESEARCH

Professor Aspin, with Professors Sass-Kortsak and Levison of the Department of Paediatrics, is using radionuclides of copper to study copper metabolism and the role of ceruloplasmin in Wilson's disease. They are also studying the factors which influence the deposition of aerosols in the respiratory tract with reference to the use of mist tents in the treatment of cystic fibrosis. Much of this work is carried out at the Hospital for Sick Children.

Professor Bruce, with Dr. Meistrich, is continuing his studies of the processes of differentiation in the testes of mice using cell separation and biochemical techniques. He continues to be involved in the use of computers to handle patient records in the clinics of the Ontario Cancer Treatment and Research Foundation, in the application of computers to patient control at the Princess Margaret Hospital, and in his studies on the effect of new chemotherapeutic agents in the treatment of cancer.

Professor Cunningham heads a group using experimental and computer methods to determine radiation dose distributions within patients undergoing radiotherapy. A number of computer programmes have been developed and are in routine use for radium calculations and external beam therapy. The group is working closely with the Atomic Energy of Canada in the development of a dedicated computer for dose calculations. They are also involved in preparing the space and special equipment for dose control of the new 35-Mev clinical linear accelerator which will be installed at the Ontario Cancer Institute this year.

Professor Howatson is continuing his studies on the fine structure of cells, viruses, and macromolecules, using electron microscopy. The genetics and physiology of replication of an RNA virus are being studied by means of temperature sensitive mutants.

Professor Hunt and Professor Johns are studying the initial processes of radiation damage to solutions containing the components of DNA. Using short, intense pulses of UV light, the reactions of pyrimidines have been detected and studied. High-energy intense bursts of electrons from the linear accelerator in the Physics Department enable us to detect reactive radiation species in water in times as short as 20 picoseconds (20×10^{-12} sec). These investigations are forcing scientists to rethink many of the theories of radiation chemistry and the models for reactions in concentrated solutions which occur inside the cell.

Professor McCulloch and Professor Till have continued their studies of the regulation of hemopoiesis. Using colony methods *in vivo* and in culture, combined with cell separation and genetic techniques, they have established three stages in hemopoietic differentiation, and are investigating specific mechanisms regulating transitions between them. Clinical studies of marrow transplantation and acute leukaemia have been initiated.

Professor Miller and Professor Phillips are studying the cellular events involved in the differentiation of the immune system. They are continuing to develop physical methods suitable for purifying and analysing the cells at different stages of development. Professor Phillips is actively involved in a programme directed toward transplantation of human bone marrow. Professor Miller is attempting to characterize human red cells by physical means, with the objective of developing methods which may be used in routine haematology.

Professor Ottensmeyer, extending the use of dark field electron microscopy, is applying the technique to the study of the fine structure of macromolecules, including the base sequence of nucleic acids such as DNA and transfer RNA.

Professor Rauth and Professor Whitmore are continuing their investigation of the effects of ionizing radiation, ultraviolet light, and various chemotherapeutic agents on mammalian cells in tissue culture. In addition, Professor Whitmore in collaboration with Professors Till and Siminovitch, has begun an investigation of the isolation and characterization of temperature sensitive mutants of mouse L cells *in vitro*.

Professor Sheinin is continuing her studies on the mechanism of oncogenesis by

polyoma and SV40 viruses. Investigations of the DNA metabolism of virus-infected cells has permitted identification of the terminal intermediate of polyoma DNA synthesis, the formation of which is intimately linked with aberrant patterns of cell DNA synthesis. Analyses of the surfaces of normal and virus-transformed tumour cells has revealed profound differences in the glycolipids and glycoproteins of plasma membrane and of surface component at the extreme cell periphery.

Professor Stanners is continuing his studies on the molecular biology of mammalian cells. He is concerned with the balance of macromolecular synthesis in cultured normal and malignant cells in different growth states and the effect of viruses on this balance. He is particularly interested in a type of bovine enterovirus which apparently causes the selective distribution of tumours in animals.

Professor Taylor is continuing his investigation of the function of the heart and arterial bloodflow. Densitometry of X-ray angiographic pictures, either on cine film or as television pictures, is being studied to see if it will give more detailed information about heart volume and wall motion. Doppler ultrasound is being investigated as a means of measuring wall motion and speed of blood flow. This work is carried out at the Toronto General Hospital.

Dr. Whitmore, together with Drs. Thompson, Baker, Siminovitch and Till, is continuing work on various aspects of mammalian somatic cell genetics *in vitro*. The major emphasis of this work to date has been on the isolation and characterization of auxotrophs, drug resistant and temperature-sensitive mutants both of mouse L-cells and Chinese hamster ovary cells.

HONOURS

W.R. Bruce, the First Lectureship, The William Dameshek Lectureship, American Society of Hematology, San Juan, Puerto Rico, December 1970.

J.R. Cunningham, the Gordon Richards Memorial Lecturer, Canadian Association of Radiologists, Calgary, Alberta, March 1971.

H.E. Johns, Betty Focht Memorial Lecturer, Radiological and Medical Physics Society of New York, New York, May 1971. Awarded the Henry Marshall Tory Medal by the Royal Society of Canada, June 1971. This is a gold medal awarded in recognition of outstanding research.

E.A. McCulloch, Medical Research Council Visiting Professorship at the University of Alberta, February 1971.

R. Sheinin, Medical Research Visiting Professorship in Department of Biochemistry, University of Alberta, March 1971.

SCHOLARLY ADDRESSES

Professor N. Aspin, "The distribution of inhaled droplets in patients with cystic fibrosis following mist tent therapy," GAP Conference on Cystic Fibrosis, Val David, Quebec, October 1970; with N. Marceau and Dr. A. Sass-Kortsak, "Evidence for the physiological role of ceruloplasmin," Canadian Society for Clinical Investigation, Ottawa, January 1971; "Cerebral blood flow in hypoxemic anesthetized dogs," 45th Congress of the International Anesthetists' Research Society, Miami, March 1971.

Professor W.R. Bruce, "Spermatogenesis Workshop," Medical Research Council, Montreal, June 1970; "The William Dameshek Lectureship," American Society of Hematology, San Juan, Puerto Rico, December 1970; "Selective Action of Concanavalin A on Transplanted Tumors of the Mouse," Annual Meeting, American Association for Cancer Research, Chicago, April 1971; "Selective Action of Concanavalin A (Con A) on Experimental Tumors," Meeting on Interaction of Lectins, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York, May 1971.

Professor J.R. Cunningham, "Review Paper," as Joint Chairman, Third International Conference on Uses of Computers in Radiotherapy, Glasgow, Scotland, September 1970; "Treatment Planning with Computers," Open Symposium on Computers in Radiotherapeutics, Royal College of Physicians and Surgeons, Glasgow,

Scotland, September 1970; "Cooperation Hodgkin's Disease Clinical Trial," Participation in Workshop, O'Hare Inn, Chicago, September 1970; "Uses of Computers in Radiotherapy at the Ontario Cancer Institute," Workshop on Computer Applications, Delaware Valley Chapter, American Association of Physicists in Medicine, Jefferson Medical College, Philadelphia, October 1970; "The Stampede to Compute – Computers in Radiology," The Gordon Richards Memorial Lecture, Annual Meeting, Canadian Association of Radiologists, Calgary, Alberta, March 1971; "Use of Computers in Clinical Radiology" and "Current Problems in Radiation Dosimetry of Extended Field Irradiation," Calgary, Alberta, March 1971; "A Comparison of Computing Systems at the Ontario Cancer Institute, Symposium on Computers in Medical and Health Physics, American Association of Physicists in Medicine, University of Illinois, Chicago, May 1971.

Professor A.F. Howatson, "Spermatogenesis in the Mouse Studied by Cell Separation in Velocity Sedimentation Gradients," 7th International Congress of Electron Microscopy, Grenoble, France, August 1970.

Professor J.W. Hunt, "Picosecond Pulse Radiolysis of Aqueous Solutions," Canadian Association of Physicists, Annual Meeting, Winnipeg, Manitoba, June 1970; "A Stroboscopic Pulse Radiolysis System Capable of 20 Picosecond Time Resolution," IVth International Congress of Radiation Research, June 1970; "Pulse Radiolysis in the Sub-nanosecond Region," Gordon Research Conference on Radiation Chemistry, New Hampton School, New Hampton, New Hampshire, July 1970; "Radiation Reactions at the Speed of Light," National Research Council, Ottawa, February 1971; "Pulse Radiolysis at the Speed of Light," Ohio State University, Columbus, Ohio, March 1971; "Recent Results in Picosecond Pulse Radiolysis," Miller Conference on Radiation Chemistry, Porto Conte, Sardinia, April 1971; "Pulse Radiolysis in Picosecond Times," Carnegie-Mellon University, Radiation Research Laboratories, Pittsburgh, May 1971; "Hydrated Electron Reactions at Picosecond Times with no Scavenger and with High Concentrations of Positive Ion Scavengers," Radiation Research Conference, Boston, May 1971; "Reactions of the Hydrated Electron with Concentrated Scavengers Studied by Picosecond Pulse Radiolysis," Radiation Research Conference, May 1971.

Professor H.E. Johns, "Studies of Pyrimidine Triplet States and their Chemical Reactions," 4th International Congress of Radiation Research, Evian, France, June 1970; "Research at the Ontario Cancer Institute," London University, London, June 1971; "Technical Developments in Medical Research with Special Reference to Accelerators for Radiotherapy," Chalk River Nuclear Laboratories, Chalk River, July 1970; "Biophysics and its Applications in Medicine," Canadian Undergraduate Physics Conference, Edmonton, Alberta, October 1970; "A Physicist in Biological Research," Brandon University, Brandon, Manitoba, February 1971; University of Saskatchewan, Regina Campus, February 1971; University of Manitoba, Winnipeg, Manitoba, February 1971; Lakehead University, Thunder Bay, February 1971; "Matrix Dosimetry for High Energy Radiotherapy Machines" (with W.B. Taylor), American Radium Society Meeting, 53rd Annual Meeting, Mexico City, March 1971; "Biophysics Research at the Ontario Cancer Institute," Guelph University, Guelph, April 1971; "Early Events in Radiation Damage to Pyrimidines," Sloan Kettering Institute for Cancer Research, New York, May 1971; "Radiological Physics – Past and Future," Betty Focht Memorial Lecturer, Radiological and Medical Physics Society of New York, May 1971.

Professor E.A. McCulloch, "Hemopoietic Cellular Differentiation: A problem at the interface between Biology and Medicine," Queen's University, Kingston, December 1970; "Regulatory Mechanisms Acting on Hemopoietic Stem Cells: Some Clinical Implications," Federation of American Societies for Experimental Biology Annual Meeting, Chicago, April 1971; "Summary," Symposium on Hematopoietic Stem Cells, XIII International Society of Hematology, Munich, Germany, August 1970; "Summary of Symposium on Immunology and Cancer," University of Ottawa, May 1971.

Professor R.A. Phillips, "Cellular Interaction in the Immune Response: Analysis by Physical Separation of the Cells," University of Connecticut, February 1971; with Dr. E.A. McCulloch and Dr. D. Amato, "Bone Marrow Transplantation and the Treatment of Leukemia," The Canadian Cancer Society, Toronto, January 1971; "Review of the Bone Marrow Transplants at the Ontario Cancer Institute," 3rd International Congress, Transplantation Society, The Hague, August 1970.

Professor F.P. Ottensmeyer, "Dark Field Electron Microscopy Techniques to Reveal Molecular Shapes," Pathobiology Conference, Aspen, Colorado, August 1970; "Dark Field Electron Microscopy of Atoms and Molecules," State University of New York at Buffalo, April 1971.

Professor A.M. Rauth with N. Christou and S. Shuve, "Effects of Phleomycin on the Sedimentation Properties of Mouse L Cell DNA," Biophysical Society Meetings, New Orleans, February 1971; with M. Domon, "Potentiation of Ultraviolet Light Damage in Mouse L Cells by CMEL," Radiation Research Society Meeting, Boston, Mass., May 1971; with S. Shuve, "Effects of Phleomycin on the Sedimentation Properties of *E. coli* DNA," Canadian Federation of Biological Societies, Toronto, June 1971; with S.F.H. Chiu, "Studies of Nascent DNA Synthesis in UV irradiated Mouse L Cells," Canadian Federation of Biological Societies, Toronto, June 1971.

Professor R. Sheinin, "Surface Alterations in Cells Transformed by the Oncogenic DNA Viruses," Canadian Federation of Biological Societies, Montreal, June 1970; "Comparative Analysis of Peptides of the Cell Membrane of 3T3 Mouse Cells and sv40 Transformed 3T3 Cells," xth International Congress of Microbiology, Mexico City, August 1970; "Surface Glycoproteins of Normal and sv40 Transformed Cells," The Toronto Biochemical and Biophysical Society Membrane Symposium, Medical Sciences Building, University of Toronto, September 1970; "Current Concepts on the Induction of Cancer," First National Canadian Science Teachers Conference, Toronto, November 1970; "Studies of Components on the Surface of Normal and Virus-Transformed Mouse Cells," 2nd Lepetit Symposium, Paris, France, November 1970; "The Surface of Normal and Virus-Transformed Mouse Cells," University of Toronto, November 1970; "Studies of Transformed Cell Surfaces," University of Toronto, November 1970; "The DNA-Oncogenic Viruses," Students of Diploma in Bacteriology, School of Hygiene, University of Toronto, December 1970; "DNA Synthesis in Animal Cells, as Affected by Oncogenic Viruses," "The Mechanism of Oncogenesis by the RNA Tumor Viruses," and "Recent Developments in the Study of the RNA Tumor Viruses," University of Alberta, Department of Biochemistry, Alberta, March 1971; "Virus-Induced Membrane Changes," University of Toronto, March 1971; "The Essential Biochemical Properties of the DNA Oncogenic Viruses," and "The Essential Biochemical Properties of the RNA Oncogenic Viruses," Department of Microbiology, University of Toronto, April 1971.

Professor C.P. Stanners, with H. Becker, "Ribosome Complement in Resting and Proliferating Hamster Cells," Canadian Federation of Biological Societies, Montreal, June 1970; with M. Adams, "Characteristics of the Stationary Phase of a Malignant Cell Line in Monolayer Culture," Canadian Federation of Biological Societies, Montreal, June 1970.

Professor J.E. Till, "Cellular Differentiation in the Blood Forming System," The Toronto Biochemical and Biophysical Society, Differentiation Symposium, University of Toronto, January 1971; "Hemopoietic Stem Cells," Clinical Aspects and Basic Immunological Considerations, University of Manitoba, University of Saskatchewan and University of Alberta, January 1971; "Hemopoietic Stem Cells," Institut du Cancer, Montreal, March 1971; "Cellular Differentiation: A Biophysicists Approach," University of Waterloo, March 1971; "Regulation of Growth and Differentiation in Mammalian Cells," Wright State University, Dayton, Ohio, April 1971.

Professor G.F. Whitmore, "Radiobiology at the Cellular Level," IVth International Congress of Radiation Research, Evian, France, June 1970; "Natural and Induced Synchronous Cultures," Tissue Culture Association, Washington, June 1970; "Mammalian Cell Radiobiology," Radiological Society of North America, Chicago,

November 1970; "The Effect of Chemotherapeutic Agents on Mammalian Cells," Radiological Society of North America, Chicago, November 1970; "*In Vitro* Studies on Genetic and Carcinogenic Effects of Radiation," Argonne Conference on Low Level Effects, Argonne, December 1970; "Radiation-Induced Mitotic Delay," Third L.H. Gray Memorial Conference, Manchester, England, January 1971; "Radiotherapeutic Uses of Fast Neutrons," National Institutes of Health Meeting on Neutrons, Washington, January 1971; "Special Beams in Radiotherapy," Aspen Conference, Aspen, Colorado, March 1971; "Temperature-Sensitive Mutants of Mammalian Cells," Pinawa, Manitoba, March 1971; "The Use of *In Vitro* Techniques for the Study of Radiation Mutagenesis," Radiation Research Society, Boston, May 1971; "Radiobiological Investigations of Mammalian Cells," Frontiers in Cancer Course, Augusta, Georgia, May 1971; "Potential Uses of π-Mesons for Radiation Therapy," TRIUMF Seminar, Vancouver, B.C., May 1971; "Pretherapeutic Trials of Negative π-Mesons," TRIUMF Seminar, Vancouver, B.C., May 1971.

PUBLICATIONS

Austin, P.E., McCulloch, E.A. and Till, J.E. "Characterization of the Factor in L-Cells Conditioned Medium Capable of Stimulating Colony-Formation by Mouse Marrow Cells in Culture" (*Journal of Cellular Physiology*, vol. 77, 1971, pp. 121–34).

Becker, H., Stanners, C.P. and Kudlow, J.E. "Control of Macromolecular Synthesis in Proliferating and Resting Syrian Hamster Cells in Monolayer Culture. II. Ribosome Complement in Resting and Early GI Cells" (*Journal of Physiology*, vol. 77, 1971, pp. 43–50).

Bronskill, M.J., Wolff, R.K. and Hunt, J.W. "Picosecond Pulse Radiolysis Studies. I. The Solvated Electron in Aqueous and Alcohol Solutions" (*Journal of Chemical Physics*, vol. 53, 1970, pp. 4201–10).

Bruce, D.L., Lin, H. and Bruce, W.R. "Reduction of Colony Forming Cell Sensitivity to Arabinosyl Cytosine by Halothane Anesthesia" (*Cancer Resarch*, vol. 30, 1970, pp. 1803–5).

Bruce, W.R., Lam, D.M.K., Hughes, T.J. and Furrer R. "Physical and Chemical Studies of Sperm Production" (*C.M.A. Journal*, vol. 103, 1970, pp. 885–8).

DeBoer, G. and Johns, H.E. "Hydrogen Exchange in Photohydrates of Cytosine Derivatives" (*Biochimica et Biophysica Acta*, vol. 204, 1970, pp. 18–30).

DeBoer, G., Klinghoffer, O. and Johns, H.E. "Reversal Mechanisms for the Photohydrates of Cytosine and its Derivatives" (*Biochimica et Biophysica Acta*, vol. 213, 1970, p. 253).

Fisher, G.J. and Johns, H.E. "Ultraviolet Photochemistry of Thymine in Aqueous Solution" (*Photochemistry and Photobiology*, vol. 11, 1970, pp. 429–44).

Gorczynski, R.M., Miller, R.G. and Phillips, R.A. "Homogeneity of Antibody Producing Cells as Analyzed by Their Buoyant Density in Gradients of Ficoll" (*Immunology*, vol. 19, 1970, pp. 817–29).

Graham, F.L. and Whitmore, G.F. "The Effect of 1-β-D-Arabinofuranosylcytosine on Growth, Viability, and DNA Synthesis of Mouse L-Cells" (*Cancer Research*, vol. 30, 1970, pp. 2627–35).

——— "Studies in Mouse L-Cells on the Incorporation of 1-β-D-Arabinofuranosylcytosine into DNA and on Inhibition of DNA Polymerase by 1-β-D-Arabinofuranosylcytosine 5′-Triphosphate" (*ibid.*, pp. 2636–44).

Howatson, A.F. "Oncogenic Viruses: A Survey of Their Properties"; in *Comparative Virology*, by E. Kirstak and K. Maramorosch, pp. 509–537. New York: Academic Press, 1971.

——— "Measles"; in *Year Book of Science and Technology*, McGraw-Hill, 1971, pp. 263–5.

Iscove, N.N., Till, J.E. and McCulloch, E.A. "The Proliferative States of Mouse Granulopoietic Progenitor Cells" (*Proceedings of Society for Experimental Biology and Medicine*, vol. 134, 1970, pp. 33–6).

Iscove, N.N., Senn, J.S., Till, J.E. and McCulloch, E.A. "Colony Formation by Normal Leukemic Human Marrow Cells in Culture. Effects of Conditioned Medium From Human Leukocytes" (*Blood*, vol. 37, 1971, pp. 2–5).

Lam, D., Furrer, R. and Bruce, W.R. "The Separation, Physical Characterization and Differentiation Kinetics of Spermatogonial Cells of the Mouse" (*Proceedings of National Academy of Sciences*, vol. 65, 1970, p. 192).

MacDonald, H.R. and Miller, R.G. "Synchronization of Mouse L-Cells by a Velocity Sedimentation Technique" (*Biophysical Journal*, vol. 10, 1970, pp. 834–42).

Marceau, N., Kruck, T.P.A., McConnell, D.B. and Aspin N. "The Production of Copper 67 from Natural Zinc Using a Linear Accelerator" (*International Journal of Applied Radiation and Isotopes*, vol. 21, 1970, pp. 667–9).

McCool, D., Miller, R.J., Painter, R.H. and Bruce, W.R. "Erythropoietin Sensitivity of Rat Bone Marrow Cells Separated by Velocity Sedimentation" (*Cell and Tissue Kinetics*, vol. 3, 1970, pp. 55–65).

McCulloch, E.A. and Till, J.E. "Effects of Short Term Cultures on Populations of Hemopoietic Progenitor Cells from Mouse Marrow" (*Cell Tissue Kinetics*, vol. 4, 1971, pp. 11–20).

Onodera, K. and Sheinin, R. "Macromolecular Glucosamine-Containing Components of the Surface of Cultivated Mouse Cells" (*Journal of Cellular Science*, vol. 7, 1970, pp. 337–55).
Park, C.H., Bergsagel, D.E. and McCulloch, E.A. "Mouse Myeloma Tumor Stem Cells: A Primary Cell Culture Assay" (*Journal of the National Cancer Institute*, vol. 46, 1971, pp. 411–22).
Rauth, A.M., Barton, B. and Lee, C.P.Y. "Effects of Caffeine on L Cells Exposed to Mitomycin C" (*Cancer Research*, vol. 30, 1970, pp. 2724–9).
Sheinin, R. and Onodera, K. "Studies on the Biochemical Properties of Surface Component of Normal and SV40 Transformed 3T3 Mouse Cells" (*Canadian Journal of Biochemistry*, vol. 48, 1970, pp. 851–7).
Sheinin, R., Onodera, K., Yogeeswaren G. and Murray, R.K. "Studies of Components of the Surface of Normal and Virus-Transformed Mouse Cells"; in *The Biology of Oncogenic Viruses*, by L.G. Silverstri, pp. 274–385. Amsterdam: North-Holland, 1971.
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Stanners, C.P., Elicieri, G. and Green, H. "Two Types of Ribosomes in Mouse Hamster Cells" (*Nature*, vol. 230, 1971, p. 52).
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Taylor, K. "Electrical Hazards in the Operating Room, With Special Reference to Electrosurgery" (*Canadian Journal of Surgery*, vol. 13, 1970, pp. 362–74).
Thompson, L.H., Mankovitz, R., Baker, R.M., Till, J.E., Siminovitch, L. and Whitmore, G.F. "Isolation of Temperature-Sensitive Mutants of L-Cells" (*Proceedings of the National Academy of Science U.S.*, vol. 66, 1970, pp. 377–84).
Till, J.E. and McCulloch, E.A. "Initial Stages of Cellular Differentiation in the Blood Forming System of the Mouse"; in *Development Aspects of Cell Cycle*, by I.L. Cameron, G.M. Padilla and A.M. Zimmerman, pp. 297–313. New York: Academic Press, 1971.
Till, J.E., Wilson, S. and McCulloch, E.A. "Repression of Colony Formation Reversed by Anti-Mouse Thymocyte Serum" (*Science*, vol. 169, 1970, pp. 1327–9).
Whillans, D.W. and Johns, H.E. "Properties of the Triplet States of Thymine and Uracil in Aqueous Solution" (*Journal of the American Chemical Society*, vol. 93, 1971, pp. 1358–62).
Whiting, R.F. and Ottensmeyer, F.P. "Dark Field Electron Microscopy of Atoms and Molecules" (*Biophysical Journal*, vol. 11, 1971, p. 215a).
Whitmore, G.F. "Natural and Induced Synchronous Cultures" (*In Vitro*, vol. 6, 1971, pp. 276–85).
Wolff, R.K., Bronskill, M.J. and Hunt, J.W. "Picosecond Pulse Radiolysis Studies II. Reactions of Electrons with Concentrated Scavengers" (*Journal of Chemical Physics*, vol. 53, 1970, pp. 4211–15).

MEDICAL CELL BIOLOGY

Under the direction of Professor L. Siminovitch

Professor J.P. Carver is concerned with the overall problems of determining the forces that stabilize the 3-dimensional structure of protein. Using a large spin-echo spectrometer he is currently examining the way in which ions affect protein stability. In conjunction with Dr. M. Buchwald, he is using temperature-sensitive mutants of λ bacteriophage lysozymes, which have modified amino acid sequences, to investigate the role of primary sequence changes in protein stabilization.

Professor B. Cinader and his colleagues have continued their work on the regulation of the antibody response. Genetic factors, which control tolerance induction and tolerance breakdown, are being analysed in collaboration with Dr. J.E.M. St. Rose.

The nature of cell receptors on thymus and bone marrow cells is being investigated in collaboration with Dr. A.M. Kaplan, using the mouse as the experimental animal, reconstitution as an experimental tool, and allotypic specificity and tolerance as cell markers.

The complement deficiency of certain inbred mouse-strains have been employed to investigate immunosuppression by antibody against allotypes in collaboration with Dr. S. Dubiski, and by antilymphocyte serum in collaboration with Dr. H.F. Jeejee-

bhoy. In the latter study, it was shown that most antilymphocyte sera contain a graft-rejecting and complement-dependent antibody. An assay procedure for this antibody is being developed.

Professor C.R. Fuerst is continuing studies on the functions of viral and host genes in the reproduction of the temperate phage lambda in its host *Escherichia coli*. New phage genes which are involved in morphogenesis of lambda particles have been identified. Several mutations have been produced in host genes which are involved in events concerned with lambda reproduction. In some of the host mutants there is a block in early strand-specific transcription of phage DNA. Examples have also been obtained of mutations which block phage development at a late stage of the growth cycle.

Professor M. Gold is continuing studies on phenomena affecting macromolecular DNA. The maturation of bacteriophage DNA into a biologically active form is being investigated by physico-chemical techniques including electron microscopy. On the biological level, the mechanism of host controlled modification and restriction of foreign DNA is being clarified. Work on the enzymology of DNA reactions is also continuing. A new endonuclease has been discovered and purified which will turn out to be extremely useful in DNA research. This enzyme appears to catalyse the nicking of circular DNA molecules at one and only one site.

Professor Lorne A. MacHattie is continuing research on the structure of the chromosomes of bacteriophage viruses P-1 and D-108, and is making a beginning on genetic work with P-1.

Professor M.L. Pearson is attempting to define, at a biochemical level, the molecular mechanisms regulating the expression of different genes in bacteriophage lambda. It is desirable to have available a lambda DNA-dependent protein-synthesizing system capable of mimicking *in vitro* the salient features of genetic control observed *in vivo*. During the past year, two such systems have been established which make lambda DNA-coded proteins *in vitro*, as judged by electrophoresis in SDS-polyacrylamide gels. By the appropriate use of known mutant phage DNAs and protein synthetic extracts from uninfected and phage-infected bacteria, it is now possible to isolate and to study phage and host-coded factors regulating viral RNA and protein synthesis. These experiments in a relatively simple bacterial system will not only clarify further our understanding of the general features of genetic regulatory processes at the molecular level, but they should also point the way to an intelligent attack on similar problems in the more complex case of human cells.

Professor B.D. Sanwal is doing research in the general area of allosteric control mechanisms involving energy generation and utilization in *Escherichia coli*. In particular, mechanisms regulating uptake, transport and utilization of 6-carbon and 4-carbon compounds are being studied. A periplasmic protein-binding C_4 compound has been isolated and its control by catabolite repression (i.e., by cyclic AMP levels) has been demonstrated. Technology for the isolation of membrane vesicles from *E. coli* has been developed. These vesicles have been shown to be capable of transport and retention of diverse compounds of biological interest. In addition, genetic techniques are being exploited to identify the components of transport systems for C_4 acids.

In collaboration with Professor M.L. Pearson a programme has been initiated to study the mechanism of differentiation of mouse neuroblastomas into neurones. As a beginning, the differences in the galactolipid and cerebroside constituents of undifferentiated and differentiated neuroblasts are being examined.

Professor Louis Siminovitch has continued his studies on the morphogenesis of bacteriophage λ. Most of the genes involved in morphogenesis have been identified and numerous aspects of the control of these genes have been examined. In collaboration with Drs. G.F. Whitmore and J.E. Till, temperature-sensitive conditional lethal mutants of somatic cells have been isolated and a preliminary characterization of these mutants has been made. Methods are being developed for the isolation of further conditional lethal mutants, in addition to other mutants of somatic cells.

Professor M.W. Thompson, in collaboration with Professor L. Siminovitch and Dr. M. Buchwald, has begun a new research project in human somatic cell genetics. Fibroblast and lymphoblast culture techniques have been established. Studies with fibroblasts are directed chiefly towards elucidation of the cellular defect in diseases in which there is increased susceptibility to leukaemia (Bloom's syndrome and Fanconi's anaemia). Studies with lymphoblasts are concerned with the normal biology of these cells, including techniques for handling them quantitatively, and with learning what phenotypes known to be expressed in fibroblasts are also expressed in lymphoblasts.

HONOURS

Dr. B. Cinader was elected a Fellow of the Royal Society of Canada.

SCHOLARLY ADDRESSES

J.P. Carver, "Applications of Nuclear Magnetic Resonance and Relaxation Measurements," Department of Chemistry, Laurentian University, Sudbury, January 25, 1971; (with B.H. Barber) "The High Resolution Proton Magnetic Resonance and Circular Dichroism of the Lysozyme of Bacteriophage Lambda," Canadian Federation of Biological Societies, University of Toronto, Toronto, June 16, 1971; (with J.A. Dunn) "Salt Effects on Poly-L-Proline," Canadian Federation of Biological Societies, University of Toronto, Toronto, June 16, 1971.

B. Cinader, "Allotypy as a Probe" and "Tolerance Regulation," nato Advanced Study Institute, Brugge-Belgium, July 1970; "Cellular Differentiation and Regulation of the Immune Response," Minaki Lodge, near Winnipeg, Manitoba, July 1970; "Antibodies of Restricted Heterogeneity; Antibodies to Enzymes," *Chairman*: 8th International Congress of Biochemistry, Interlaken, Switzerland, September 1970; "A Murine Complement Defect as a Tool in the Analysis of Immunosuppression by als," 4th Canadian Conference on Research in the Rheumatic Diseases, Toronto, October 1970; "Regulation and Immunological Tolerance," Institute of Medical Technology, Toronto, March 1971.

M.L. Pearson, "The Molecular Basis of Differentiation in Bacteriophage Lambda," Toronto Biochemical and Biophysical Society, Toronto, January 1971.

B.D. Sanwal, "Enzymic Regulation of Diverging and Converging Sequences of Metabolic Pathways," Department of Biology, Queen's University, Kingston, October 1970; "Problems and Strategy of Control of Amphibolic Pathways in Bacteria," Department of Biology, McMaster University, Hamilton, October 1970; "Regulatory Interactions Amongst Biochemical Pathways," Department of Microbiology, University of Manitoba, Winnipeg, February 1971; (with H.W. Duckworth and M.L. Hollier) "Allostery and Subunit Structure of Phosphoglucomutase," Canadian Federation of Biological Societies, University of Toronto, Toronto, June 1971; (with E.B. Waygood) "Pyruvate Kinase of *E. coli*," Canadian Federation of Biological Societies, University of Toronto, Toronto, June 1971.

L. Siminovitch, *Chairman*, Committee of World Health Organization, unesco, Paris, France, August 1970; "Isolation and Characterization of Mutants of Conditionally-Lethal Mutants," Department of Biochemistry, McMaster University, Hamilton, December 1970; Medical School, University of Alberta (Calgary), November 1970; Medical School, Washington University, St. Louis, Missouri, January 1971; "Present Outlook in Respect to Genetic Engineering," Clarke Institute, University of Toronto, January 1971; "The Isolation and Characterization of Mutants of Somatic Cells," 9th Canadian Cancer Research Conference (sponsored by the National Cancer Institute of Canada), Honey Harbour, Ontario, June 1971.

M.W. Thompson, "Idiopathic Scoliosis: Preliminary Report of a Genetic Survey," International Scoliosis Research Society, Toronto, September 1970; "Some Principles of Medical Genetics," International Symposium on Malignant Hyperthermia, Toronto, May 1971; "Reticuloendotheliosis: An Autosomal Recessive Disorder

Resembling Runt Disease," 4th Conference on Clinical Delineation of Birth Defects, Johns Hopkins University, Baltimore, Maryland, June 1971.

PUBLICATIONS

Buchwald, M., Steed-Glaister, P. and Siminovitch, L. "The Morphogenesis of Bacteriophage Lambda. I, Purification and Characterization of λ Head and λ Tails" (*Virology*, vol. 42, 1970, pp. 375–89).

Buchwald, M., Murialdo, H. and Siminovitch, L. "The Morphogenesis of Lambda. II, Identification of the Principal Structural Proteins" (*Virology*, vol. 42, 1970, pp. 390–400).

Cinader, B., Jeejeebhoy, H.F., Koh, S.W., and Rabbat, A.G. "Immunosuppressive and Graft Rejecting Antibodies in Heterologous Antilymphocytic Serum" (*Journal of Experimental Medicine*, vol. 133, 1970, pp. 81–99).

MacHattie, L.A. "Gene"; in *McGraw-Hill Yearbook of Science and Technology*, pp. 212–15. New York: McGraw-Hill Book Co., 1970.

MacHattie, L.A. and Thomas, C.A., Jr. "Viral DNA Molecules"; in *Handbook of Biochemistry*, ed. Herbert A. Sober, 2nd ed. sect. H, pp. H3–8. Cleveland: Chemical Rubber Co., 1970.

Naylor, D.H. and Cinader, B. "Derivatives of the Complement Component MuB1 ($C5^{mu}$) and Separation of a Factor Involved in the Conversion of MuB1 to $MuB1_f$" (*International Archives of Allergy and Applied Immunology*, vol. 39, 1970, pp. 540–65).

——— "Inheritance, Hormonal Regulation and Properties of Polymorphic Murine Antigens Mud1 and Mud2" (*International Archives of Allergy and Applied Immunology*, vol. 39, 1970, pp. 511–39).

Reader, R.W. and Siminovitch, L. "Lysis Defective Mutants of Bacteriophage λ: Genetic and Phenotypic Properties of S Mutants" (*Virology*, vol. 43, 1971, pp. 607–22).

——— "Lysis Defective Mutants of Bacteriophage λ: On the Role of the S Function in Lysis" (*ibid.*, pp. 623–37).

Siminovitch, L. "Temperature-sensitive Conditional Lethal Mutants of Somatic Cells" (*Canadian Medical Association Journal*, vol. 103, 1970, pp. 875–9).

Thompson, M.W. and Qazi, Q.H. "Birth Weight in Congenital Virilizing Adrenal Hyperplasia" (*Archives of Disease in Childhood*, vol. 46, 1971, pp. 350–2).

——— "Dermatoglyphics in Congenital Virilizing Adrenal Hyperplasia" (*American Journal of Diseases of Children*, vol. 122, 1971, pp. 28–30).

Thompson, M.W., Qazi, Q.H. and Hill, J.G. "The Steroid 11-oxygenation Index by Gas-Liquid Chromatography" (*Clinica Chimica Acta*, vol. 31, 1971, pp. 435–8).

Thompson, M.W., Winsor, E.J., Murphy, E.G. and Reed, T.E. "A Genetical and Clinical Study of Spinal Muscular Atrophy: Comparison of the Werdnig-Hoffman and Kugelberg-Welander Types" (*Journal of Medical Genetics*, vol. 8, 1971, pp. 143–8).

Wright, J.A. and Sanwal, B.D. "Regulatory Mechanisms Involving Nicotinamide Adenine Nucleotides as Allosteric Effectors. IV, Physicochemical Study and Binding of Ligands to Citrate Synthase" (*Journal of Biological Chemistry*, vol. 246, 1971, pp. 1689–99).

Zink, M.W. and Sanwal, B.D. "L-Leucine Dehydrogenase (*Bacillus Cereus*)"; in *Methods in Enzymology*, ed. H. Tabor and C.W. Tabor, vol. 17, pp. 799–802. New York: Academic Press, 1970.

INSTITUTE OF MEDICAL SCIENCE

Under the direction of Professor J.C. Laidlaw

This was the fourth year of the Institute's existence and the third year since its degree programmes were approved by the Appraisals Committee of the Ontario Council on Graduate Studies.

During the session 1970–71 there were 28 students in the Institute. Eight of these (M.T. Aye, O. El-Arini, A. Croy, N. Grosser, N.N. Iscove, H. Messner, M. Ogawa, and C. Park) were at the Princess Margaret Hospital, seven (L. Berka, D.G. Butler, C. Grant, W. Gregorowicz, M. Kelly, A. Lamarre, and A. Wilensky) at the Hospital for Sick Children, nine (J. Farkas, R.W. Hudson, S. Huterer, H. Kim, B. Lukie, A. Magill, C. Price, I. Salti, and A. Yates) in the Clinical Science Division of the Medical Sciences Building, two (D.W. Gray and K. Shumak) at the Toronto General

Hospital, one (E. Shinder) at the Toronto Western Hospital, and one (J. Warsh) at the Clarke Institute of Psychiatry. Of the 28 students, 22 had the M.D. degree, three the D.V.M. degree and three had bachelor degrees. Eighteen students were registered for the Ph.D. degree and ten for the M.Sc. degree. The student seminars were again capably arranged by Dr. G. Steiner; a seminar was given by each student during the year. The practice of assigning to each student a programme committee consisting of his or her supervisor and two other members of the University staff has been continued. At the Spring Convocation Dr. K. Shumak was granted the M.Sc. degree. His supervisor was Dr. J.C. Crookston, and the title of his thesis was "Transplantation Immunology of the Heart." The external appraiser of his thesis was Dr. R.D. Guttmann, Director, Transplantation Service, Royal Victoria Hospital, Montreal. Also at the Spring Convocation, Dr. I.S. Salti was awarded the Ph.D. degree. His supervisor was Dr. J.L. Ruse, and the title of his thesis was "16α-Hydroxylation of Progesterone by Rat Liver." The external appraiser of his thesis was Dr. A. Clark, Department of Biochemistry, Queen's University, Kingston.

In the session 1970–71 the Institute offered one new course, "Mathematics for Medical Scientists," by Dr. H. Johns. This course was very well received by the students.

During the year the following men became members of staff of the Institute: R.E. Falk (Surgery), J.M. Fredrickson (Otolaryngology), and C.H. Tator (Surgery). With these changes, the staff now numbers 70, of whom 45 are from clinical departments, 22 from basic science departments of the Faculty of Medicine, and 3 from the School of Hygiene.

During 1970–71 the Institute sponsored eight visiting lecturers, Drs. R. Boucher, H. Harris, S. Kety, S. P. Mistillis, E. Mosbach, L. Rosenberg, G. Russell, and D. Streeten. Dr. Boucher from the Clinical Research Institute, Montreal, spoke on "The renin-angiotensin system: methodology and clinical importance" and "Some physiological aspects of the renin-angiotensin system"; Dr. Harris, Galton Professor of Human Genetics, University College, University of London, spoke on "Human biochemical genetics"; Dr. Kety, Chairman, Department of Psychiatry, Massachusetts General Hospital, spoke on "A biologist examines the mind and behaviour"; Dr. Mistillis from the Royal Prince Alfred Hospital, Camperdown, New South Wales, Australia, spoke on "The effect of alcohol on endogenous intestinal lipids and its role in the pathogenesis of alcoholic fatty liver"; Dr. Mosbach, Director, Lipid Biochemistry Section, Public Health Research Institute of the City of New York, spoke on "Biosynthesis of bile acids: the role of regulatory enzymes"; Dr. Rosenberg, Chief, Medical Genetics Division, Yale University, spoke on "Vitamin-responsive inherited diseases"; Dr. Russell, Director, Nuffield Orthopaedic Laboratory, Oxford, England, spoke on "Pyrophosphate and diphosphonates in calcium and bone metabolism"; and Dr. Streeten, Professor of Medicine, Upstate Medical Center, Syracuse, spoke on "Studies on the pathogenesis of idiopathic oedema."

E.A. McCulloch continued to be a superb Graduate Secretary. The Executive Committee consisted of R. Volpe, G. Steiner, D. Fraser, A. Sass-Kortsak, H. Stancer, I. Broder, the Graduate Secretary, the Director, and two graduate students, R. Hudson and N. Iscove. The Student Committee consisted of A. Becker, B.S.L. Kidd, A. Sass-Kortsak, G.G. Forstner, the Graduate Secretary, and the Director. I wish to express my gratitude to all of these men, as well as to those members of staff who served on the student programme committees, for their great help during the past year.

During the Summer of 1970 a brochure on the Institute was produced, largely for prospective student applicants. It was distributed to the deans and chairmen of clinical departments of all Canadian Medical Schools, as well as to all students registered in the Division of Postgraduate Medical Education, University of Toronto.

As all members of the Institute have appointments in parent departments in the Faculty of Medicine or the School of Hygiene, the summary of their research publications, honours, and scholarly addresses will be found in the reports of the Chairmen of these departments.

MEDICINE

Under the direction of Professor C.H. Hollenberg

GENERAL COMMENTS

As in most other North American medical schools, the Faculty of Medicine at the University of Toronto has experienced over the past year severe economic constraints and the Department of Medicine has shared in these difficulties. It is likely that the period of tight money will be with us for some time, at least until there is significant change in the national mood and economy. Fortunately, the Department of Medicine enters this era with a substantial financial base, and this Department should be able to weather the difficulties ahead without experiencing a reduction in the quality of its endeavour, provided that the Department can develop further those co-operative ventures that will ensure that optimum use is made of its facilities, staff, and financial resources.

During the past year there have been significant developments in the area of postgraduate education. Under the administrative direction of Dr. Abe Rapoport, the specialty programmes of the Department have been clearly defined and published. Most of these programmes involve rotation of trainees to various of the teaching hospitals; a rotation of this sort ensures that the total resources of the Department are brought to bear upon the various training programmes. The residency programme in general internal medicine, ably directed by Dr. Joe Hilliard, continues to be extremely successful.

A further development of inter-hospital collaboration in the area of patient care as well as postgraduate education, has been fostered by the development of certain inter-hospital consulting services that link the Toronto General, New Mount Sinai, and Women's College hospitals. Such services have already been established in respiratory diseases and diabetes, and extension of this programme into other disciplines is planned.

In a new venture, the Department of Medicine and the National Sanitarium Association have jointly established a research institute whose major focus of activity will be to explore the immunological aspects of respiratory disease. The Institute will be housed in the former Gage Institute building and will be called the Gage Research Institute. Dr. I. Broder, Associate Professor of Medicine, has been named Director of the Institute and he has already begun to recruit his staff. The Institute will be linked administratively to the Toronto Western Hospital.

Despite the financial constraints placed upon it, the Department has been able to recruit, in a highly selective fashion, a number of unusually qualified new members. We are pleased to welcome Doctors C. Gryfe, A. Leznoff, T.M. Murray, G. Wong, M. Goldstein, Randolph Lee, P.D. Clarke, D.C. McGillivray, L. Schwartz, E. Phillipson, M. Silverman, G. Blandford, P. Ashby, J. Dornan, L. Silverberg, D.A.K. Roncari, J. Forstner, G. Girdauskas, C. Listgarten, N. Marcon, C. Williams, and J.A. Smith.

Our principal task for the coming year will be to continue to increase the effectiveness of the operation of the Department of Medicine and to do this in the absence of any significant increase in University and OHSC funds. Our teaching hospitals have begun to examine the total economic resources available for support of staff since it appears to be inevitable that the cost of future staff expansion must be borne, in considerable measure, by revenue derived directly or indirectly from patient care. An effective way of dealing with this problem would be to establish hospital based group practices; the success of the Sunnybrook group practice venture is clear evidence that this approach is valid and appropriate to the times.

VISITORS

Dr. C. Albahary, Paris, France; Dr. D.R. Bangham, London, England; Dr. E. Beut-

ler, Duarte, California; Dr. R. Boucher, Montreal, Quebec; Dr. L. Brumpt, Paris, France; Dr. R.D. Bulbrook, London, England; Dr. Y. Clermont, Montreal, Quebec; Dr. J. Curtis, Houston, Texas; Dr. A.J. Duggan, London, England; Dr. I. Fox, Durham, North Carolina; Dr. E. Freirich, Houston, Texas; Dr. C. Gale, Seattle, Washington; Dr. R.A. Good, Minneapolis, Minnesota; Dr. F.C. Greenwood, Honolulu, Hawaii; Dr. P. Hahn, Vancouver, British Columbia; Dr. H. Harris, London, England; Dr. E. Henderson, Bethesda, Maryland; Dr. T. Howes, Houston, Texas; Dr. W.D. Johnson, Milwaukee, Wisconsin; Dr. E.A. Kabat, New York City, New York; Dr. S. Kety, Boston, Massachusetts; Dr. B.M. Kobba, Sierra Leone, East Africa; Dr. A. Malkin, Toronto, Canada; Dr. A. Mich, Hamburg, Germany; Dr. S.P. Mistillis, New South Wales, Australia; Dr. J.J. Morgan, New South Wales, Australia; Dr. E. Mosbach, New York City, New York; Dr. M. Oka, Helsinki, Finland; Dr. K. Pierkarski, Waterloo, Ontario; Dr. P. Richards, London, England; Professor J. Rodewald, Hamburg, Germany; Dr. H. Roediger, Hamburg, Germany; Dr. L. Rosenberg, New Haven, Connecticut; Dr. R.E. Rosenfield, New York City, New York; Dr. G. Russell, Oxford, England; Dr. D.A. Sherim, British Columbia; Dr. C.J. Smyth, Boulder, Colorado; Dr. D. Streeten, Syracuse, New York; Dr. D.H. Trapnell, London, England; Dr. J. Weyman, Montreal, Quebec.

RESEARCH

Allergy–Immunology

Dr. I. Broder (TWH): mechanism of immunologic histamine release in the guinea pig lung; the role of soluble antigen-antibody complexes in human and animal diseases. Dr. S. Dubiski (TWH): research in immunobiology and immunogenetics, centred around genetically determined structural markers of rabbit immunoglobulin molecules (allotypes) and their role in the regulation of antibody formation. Dr. A. Knight (SBK): studies on a new antihistamine drug; studies of lgE. Dr. D. Osoba (PMH): investigation of the function of three classes of mouse spleen cells; studies of the association of the HL-A antigens with cancer; studies of the effect of Rifamycin-sv derivatives. Dr. W. Pruzanski (WH): study of humoral immunity in leukaemia; biological function in metabolism and lysozyme; the role and activity of hydrolytic enzymes in arthritis; relationship of humoral and cellular immunity – the influence of lysozyme on phagocytic activity; structure and function of cold agglutinins.

Cardiovascular

Dr. H.E. Aldridge (TGH): evaluation of fascia lata aortic and mitral valves; evaluation of saphenous vein aorto-coronary bypass surgery for coronary artery disease; the study of the prognosis of patients with markedly impaired ventricular contractility in ischemic heart disease. Dr. D.S. Beanlands (TWH) with Dr. David Jones: assessment of the prophylactic use of intramuscular lidocaine in myocardial infarction; with Dr. Zsoter: the assessment of soltalol, a new beta blocker, in the treatment of angina pectoris; with Dr. Petkovich: His Bundle electrocardiography, and dilineating the locations of blocks in various types of heart block; with Dr. Morse: study of the prognosis of bundle branch and ventricular block in acute myocardial infarction. Dr. K.W.J. Brown and Dr. R.L. MacMillan (TGH): a comprehensive comparison of patients with acute myocardial infarction treated in the Coronary Unit with a similar group concomitantly treated in the general medical wards; defining a more precise indication for permanent cardiac pacing after acute myocardial infarction; a study of survivors who have been treated in the Coronary Unit; a study of cardiac output in acute infarction using the technique of carbon dioxide rebreathing. Dr. P.G. Forbath (SMH): study of the early detection of prosthetic valve variance by non-invasive methods; study of the natural history of bicuspid aortic valves; investigation of patients with mid systolic clicks and/or late systolic murmurs. Dr. S. Lenkei (TWH): study of post-coronary patients in their rehabilitation programme. The patients are

subjected to sub-maximal exercise tests under continuous electrocardiographic monitoring while cardiac output and oxygen consumption are recorded; study of the Digoxin levels, correlated with kidney functions, serum proteins, and serum potassium in patients undergoing cardiopulmonary bypass and haemodyalysis; study of the natural decay of pacemaker batteries. Dr. J. Morch (TGH): studies of myocardial lactate kinetics using ^{14}C labelled lactate in patients with ischemic chest pain; 133-Xenon myocardial blood flow before and after exercise; 133-Xenon myocardial blood flow before and after aorto-coronary bypass grafting; antiarrhythmic effects of alprenolol, a new beta blocking agent. Dr. N.J. Petkovich (TWH): correlation of electrocardiographic and vectorcardiographic changes in patients with arteriosclerotic heart disease and how these changes compare with the results obtained at the time of selective coronary angiography. Dr. N. Ranganathan (SMH): studies of the systolic time intervals in patients with bundle branch block; studies of His bundle electrogram in bundle branch block; clinical studies of patients with mitral click syndrome (in collaboration with Drs. J.K. Wilson, J. Sullivan, and L. Casella); angiographic assessment and clinico-pathologic correlation in non-rheumatic mitral regurgitation (in collaboration with Drs. J.K. Wilson and Baker). Dr. E.D. Wigle (TGH): studies on automated assessment of left ventricular function. Dr. J.K. Wilson (SMH): study of mitral systolic click syndrome; detailed studies of two heart transplantation patients.

Clinical Pharmacology

Dr. W. Mahon (TGH): studies on the kinetics of beta adrenergic blocking drugs in man; studies on the kinetics of tritiated doxycycline in normals and in patients with renal failure (jointly with Dr. G. Johnson); radioimmunoassay for digoxin. Studies are being carried out on the methods of digitalization on patients with normal renal function and in patients with impaired renal function; studies on the digitalizing dose in various age groups; studies on the relationships between serum digoxen and changes in conduction in different parts of the heart. Dr. T. Zsoter (TWH): study on the effect of renal failure on the excretion of ^{3}H reserpine in hypertensive patients (with Drs. deVeber and Johnson); study on the effect of diazepan and pentazocine on veno-motor reflexes; investigation of the effect of diazoxide on the veins (with Dr. Thirlwell); double-blind trial comparing the effect of MJ1999 with propranolol in treatment of angina pectoris; studies of the effect of chlorthalidone and other diuretics on vessels.

Dermatology

Dr. H.J. Donsky (TGH): studies of the use of complamin in vitiligo and griseofulvin in psoriasis. Dr. H. Haberman (TWH): studies of the effects of specific chemicals upon the various enzymes of the porphyrin synthetizing pathway (with Dr. Menon); studies of the action spectrums in cases of photosensitivity and the effects of monochromatic light upon various enzymes; investigation of the uptake of various radioactive chemicals and the effects of combination therapy upon mouse melanoma. Dr. D.P. Varadi (WH): studies of the aging process and ultraviolet light on carbohydrate and protein metabolism in skin fibroblasts cultured *in vitro*; metabolic studies on cultured fibroblasts obtained from diabetic subjects and from sites of keloidal scarring; studies of the possible aggravating effects of pharmacologic doses of adrenal corticosteroids on Raynaud's Phenomenon. Dr. C.W. Wyse (SBK): comparison of a new topical steroid flucoinonide to betamethasone.

Endocrinology

Dr. C. Ezrin (TGH): studies of pituitary cells with radioautography in PTU-treated rats; studies of the uptake by the thyroid of 131-1 labelled bovine TSH to see if this differs from normal, or changes when the disease is brought under control by various treatments. (Graves' Disease); studies of the effects of moderate hypermetabolism induced by thyroxine on the rate of loss of lean body mass by obese patients (in col-

laboration with Dr. G. Steiner). Dr. G. From (TWH): studies of hyperinsulinaemia of myotonic dystrophy (in collaboration with the Department of Neurology); investigation of the secretion of proinsulin from a patient who appears to have a block in conversion of proinsulin to insulin. Dr. H.P. Higgins (SMH): studies concerning the virus etiology of subacute thyroiditis; studies of the effect of treatment on the TSH levels of patients with myxedema, with particular reference to the effect of heparin on free thyroxine and TSH levels (in collaboration with Dr. B. Webster); studies of the sequence of events in patients with iodine induced myxedema with regard to thyroid uptake, free thyroxine levels, and TSH levels; quantitating the renal uptake of Chloremerodrin Hg 197 mercury by the kidneys using the Gamma Camera (with Dr. N. Lamki); quantitating the uptake of technetium 99m by the thyroid gland using the Gamma Camera (in collaboration with Dr. D. Ball); studies of the effect of EDTA and calcium loading on the levels of immuno assayable parathormone (with Dr. T. Murray). Dr. R.H. Sheppard (TWH): a double-blind study of the effects of propranolol upon the thyrotoxic patients. Dr. J.C. Laidlaw (TGH): studies of the aldosterone-inhibiting effects of glucocorticoids and heparin in humans and animals (with Drs. I.S. Salti, C. Price, J.L. Ruse); Dr. S. Y. Murray (TGH): study of the pathogenesis of Graves' Disease – TSH-131_I localization in Graves' Disease; study of the evolution of the hot thyroid nodule; a comparative study – 131_I and $99m_{Tc}$ as thyroid scanning agents; an assessment of the perchlorate discharge test. Dr. P.G. Walfish (NMS): study of responses to a synthetic ACTH (beta 1–24) compound in normals and patients with Addison's disease, hypopituitarism; studies of adrenal-pituitary axis in subjects requiring exogenous steroids; studies of serial plasma immunoreactive growth hormone and plasma cortisol responses in patients with pituitary tumours before and after hypophysectomy, as well as in acromegalics treated with chlorpromazine or medroxyprogesterone. Dr. B. Webster (TGH): investigations into the regulation of thyrotropin secretion in man; use of isoelectric focusing to separate five distinct components in human thyrotropin with dissociation of immunological and biological activity between these several components (in collaboration with Dr. J.M. McKenzie in Montreal and Drs. Hummel and Brown of the Clarke Institute).

Gastroenterology

Dr. J.R. Brow (SBK): study of the absorption of iron 55 in the human both by electron microscopy and radioautography (in co-operation with Dr. Peter Pinkerton). Dr. S.V. Feinman (NMS): development of peritoneoscopic photography; study of the persistent presence of Australia antigen in serum in asymptomatic individuals and in chronic liver disease (with Dr. B. Berris and Dr. J. Sinclair); study of proteins in bile. Dr. N. Diamant (TWH): characterization of esophageal striated muscle of dogs in terms of its electrical, mechanical, and histochemical properties; study of response of lower esophageal sphincter to gastric contractile activity in dogs and man; study of the physiological disorder of the esophagus in dogs with "achalasia"; computer modelling of the electrical activity of small intestinal smooth muscle. Dr. M.M. Fisher (TGH): bile acid metabolism; ethionine metabolism; hepatic blood flow (with Dr. B. Langer and Dr. S. Popovic). Dr. G. Forstner (TWH): investigation of the surface of glycoproteins of small intestines. Dr. K.N. Jeejeebhoy (TGH): study of plasma protein synthesis and its controlling factors; these studies have included (1) preparative separation of plasma proteins, (2) effect of hormone and diet on the synthesis of albumin, fibrinogen and transferrin and, (3) effect of alcohol of plasma protein synthesis in man and animals; Dr. M. Lenczner (TGH): review and standardization of laboratory methods in clinic for tropical and parasitic diseases; survey of new drugs and tabulating of results with information to medical directors of drug companies and the Food and Drug Directorate. Dr. M.G. Sanders (TWH): study of the effect of imuran in Crohn's Disease (co-operative inter-hospital clinical trial); study of iron absorption and turnover in acute viral hepatitis using ^{59}Fe; long term follow-up of liver function tests in healthy women using oral contraceptives; the value of routine sigmoidoscopy.

Haematology and Oncology

Dr. R.E. Alison (PMH): co-operative study on Hodgkin's Disease, Stages I and II comparing local radiation with regional radiation; Hodgkin's study of Stages IIIB and IV. This study is to compare the value of two forms of combination chemotherapy, followed by radiation treatment in patients with advanced Hodgkin's Disease. Dr. D.E. Bergsagel (PMH): study of the mouse plasma cell tumour. Recently labile factor has been identified in culture media, which is required to initiate and maintain the growth of most plasma cell tumours in culture; investigation of the action of anti-neoplastic agents on normal hemopoietic and myeloma cells both *in vivo* and *in vitro*. Dr. D.H. Cowan (PMH): the development of human bone marrow transplantation; pulse-height analysis of red blood cells size and frequency distribution. Dr. J.H. Crookston (TGH): studies on some immunological aspects of rejection of cardiac allographs on dogs (in collaboration with Dr. B.S. Goldman of the Department of Surgery and Miss Ruth Saison, University of Guelph); investigation on patients with auto-immune haemolysis, the antibodies of the Ii blood group system, various blood group iso-antibodies, and abnormalities of the red cells of hereditary erythroblastic multinuclearity (in collaboration with Mrs. M. Crookston). Dr. J.A. Goldie (SMH): study of methotrexate resistance by tumour cells *in vitro*. Dr. G.D. Hart (TEG and Orthopaedic Hospital): cancer chemotherapy; paleoserology continued studies on the blood grouping on ancient skeletal material (in collaboration with Dr. C. Wells of Norwich, England). Dr. E.A. McCulloch (PMH): studies of hemopoietic stem cells and their early differentiated descendants (in collaboration with Dr. J.E. Till), basic work has been directed towards the identification of regulations of hemopoiesis acting at short-range; two large collaborative programmes are underway: (1) a human marrow transplant programme, (2) investigation of the mechanism of the mission in acute leukaemia by using cell culture methods (in collaboration with Drs. D.J.A. Sutherland, N.N. Iscove, H. Messner, and M.T. Aye). Dr. J.W. Meakin (PMH): investigation of an androgen-dependent mammary tumour in the mouse, with broad aim of determining the cellular basis of androgen dependence; study of ovarian irradiation and prednisone following mastectomy for carcinoma of the breast (in collaborative study with the Radiotherapy Department); the effects of chemotherapeutic agents on carcinoma of the breast; immunization of patients with diazotized extracts of their own tumours; human growth hormone levels in the plasma of patients with carcinoma of the endometrium. Dr. J. Senn (SBK): studies of the cell culture of human marrow. Dr. J.G. Watt (TWH): clinical assessment of cytosinearabinoside, daunamycin, thioquanine for treatment of acute leukaemia.

Metabolism and Diabetes

Dr. A. Angel (TGH): the nutritional and hormonal regulation of cholesterol uptake, synthesis, storage, and mobilization in man and lower animals; the metabolic effects of the lipolytic agents. A study is being carried out to determine whether the inhibitory effects of epinephrine and ACTH on fatty acid and protein synthesis are related to the intracellular accumulation of 3′–5′ cyclic AMP. Dr. B. Birchwood (WCH): a study of serum lipids and lipoprotein following acute myocardial infarctions in women; a study of various dietary regimens in the treatment of refrectory obesity. Dr. A. Bruce-Robertson (TGH): the effect of acute stress (ethanol) on the metabolism of liver-produced plasma proteins (in collaboration with Dr. K.N. Jeejeebhoy). Dr. N. Forbath (TGH): studies on myocardial lactate production and utilization in patients with ischemic heart disease; lactate turnover rate and lactate production from glucose in normal and diabetic patients; insulin antibody levels in patients with insulin resistance. Dr. M.L. Halperin (SMH): the mechanism whereby insulin controls the rate of fatty acid synthesis in adipose tissue; factors regulating the passage of tricarboxylate and dicarboxylate anions across mitochondrial membranes. Dr. J.E. Harrison (TGH): calcium kinetics and isotopic absorption tests have been carried out to assess the effects of various treatments on patients suffering from metabolic bone disease; investigation of vitamin D dependent calcium binding protein of human small

bowel mucosa; study of the radiation dose and deleterious effects to cauda equina of human subjects as a result of thorotrast. Dr. J.A. Little (SMH): a study of antibody response in 50 diabetic patients treated with beef sulphated insulin and comparison made with patients receiving beef Lente Insulin; a study of the use of Maleyl Insulin in the pretreatment of new diabetic patients in an attempt to improve the patients' tolerance for ordinary beef insulin; phenotyping patients with primary hyperlipoproteinemia and their first-degree relatives in order to study the genetic transmission of the different types; a study of the importance of limiting sucrose and simple sugars in the therapeutic diets of primary hyperlipoproteinemic patients by comparing lipid levels in periods when sugar is either limited or not limited; a study of Ethanol as a hyperlipoproteinemic nutrient; a follow-up study of 240 coronary and controlled subjects (in collaboration with Dr. H.M. Shanoff). Dr. A. Rapoport (TWH): chromium corrected balance studies of calcium, magnesium, and phosphorus in patients with hypoparathyroidism and hyperparathyroidism (renal osteodystrophy); study of the effects of dihydrotachysterol in both states; devised a provocative regimen which, it is hoped, will elevate serum calcium in patients with *normocalcemic* primary hyperparathyroidism and recurrent renal calculi. Suitable cases of recurrent calcium-containing renal calculi will be tested with this regimen in an attempt to detect patients with this disease; study of patients with recurrent calcium containing renal calculi to learn the effect of thiazide therapy on the capacity of their urines to calcify rachitic rat cartilage. Dr. G. Steiner (TGH): studies concerning the regulation of adipose tissue metabolism by the sympathetic nervous system, with feed-back regulation of fatty acid synthesis, and with the assessment of factors regulating lipoprotein utilization. Dr. P.G. Walfish (NMS): studies on the effect of beta adrenergic blocker, propranolol on the metabolic effects (blood sugar, immunoreactive insulin, and free fatty acids), to tolbutamide in euthyroid and hyperthyroid subjects; studies of the effect of aminophylline on tolbutamide responses in euthyroid subjects compared to newly discovered diabetic subjects; studies attempting to isolate an insulin specific protease enzyme from muscle and liver with a view to measuring plasma proinsulin levels in human subjects according to the method of Brush.

Neurology

Dr. R.M. Armstrong (TGH): assessment of cellular immune mechanisms in Myasthenia Gravis and Polymyositis; attempted induction of Polymyositis and Myasthenia Gravis in the rat and guinea pig; induction of a graft versus host reaction with thymic auto-immunization in the rat. Dr. H. Berry (SMH): electrophysiologic studies of patients with Bell's Palsy, traumatic shoulder neuritis, radial nerve palsy, and other forms of generalized neuropathy and entrapment neuritis; evoked cerebral potentials are being studied in the patients with a variety of cerebral disorders; a clinical and neuro-ophthalmologic review of experience, since 1963, of lesions involving the optic chiasm. Dr. R.D.G. Blair (TWH): somato-sensory evoked responses in normal individuals as compared with those in neurological patients having lesions in sensory pathways (in collaboration with Dr. Lee); investigation of visual evoked responses in normal individuals for comparison with those in patients during withdrawal from alcohol (in co-operation with Dr. Lee); studying the long term smoking of marijuana (in co-operation with Dr. Lee). Dr. D.R. Crapper (TGH): the electrical and behavioural consequences of dissociated neuronal microtubules as an animal model of human Alzheimer's disease. Investigations at the level of the single cell, isolated neuronal networks, and whole animal are being carried out; measurement of the concentration of encephalopathic trivalent trace metals in various human brain atrophies and dementias (in co-operation with Drs. S.S. Krishnan and K. Fritze). Dr. J. Edmeads (SBK): clinical trial of the efficacy of B.C. 105 in the prophylaxis of vascular headaches. Dr. M.E. Hill (TGH): study of L-dopa in the treatment of Parkinsonism. Dr. J.G. Humphrey (TGH): special physiological and histological studies of a form of oculo-limb myopathy carried out in three patients (in co-operation with Dr. J.P. Bouchard and N.B. Rewcastle); use of azathioprine in inflammatory myopathies;

studies of the metabolic myopathies associated with thyrotoxicosis and corticosteroids; a review of experiences with diabetic neuropathies; study of the steroids treatment of Bell's palsy. Dr. O. Kofman (NMS): study of the treatment of Parkinson's disease with L-dopa; an assessment of psychological, neurological, and hormonal corelates in patients before and during treatment with L-dopa (in collaboration with Dr. Greg Brown and Dr. Edward Brown). Dr. R.G. Lee (TWH): investigation of somato-sensory evoked responses in normal individuals, concentrating on factors such as ongoing motor activity which modify the response; recording of somato-sensory responses in neurologic patients with lesions in sensory pathways; investigation of the EEG and visual evoked responses during withdrawal from alcohol; development of on-line analysis of electromyographic data providing rapid and accurate measurement of motor unit action potentials recorded in the EMG Laboratory; study of the effect of long-term smoking of marijuana (in collaboration with Dr. Blair and investigators at the Addiction Research Foundation). Dr. R.D. MacDonald (WH): production experimental inflammatory myopathy in inbred strain of guinea pig and studies in sequential fashion of pathological changes by light and electron microscopy. Dr. J.R. Marotta (SMH): clinical studies with L-dopa. Dr. W.J. McIlroy (TWH): clinical studies of L-dopa in Parkinson's disease. Dr. R.S. McPhedran (WH): clinical studies on the remote and direct effects of malignant disease on the nervous system; clinical applications of visual evoked potentials; studies of Neuropathies with altered Glucose Metabolism. Dr. J.R. Wherrett (TGH): studies of the chemistry of glycosphingolipids and their role in disease processes. The nature, localization, and associations of glycosphingolipids in blood and their activities as blood-groups antigens are being examined. The biochemistry of new phospholipid accumulating in lipid storage disease is under investigation. The localization of glycosphingolipids in neurones is being examined through a study of changes in nerve during development. Dr. R.H. Sheppard (TWH): development of a new method for measuring circulation time using Tc99m Albumin; a study of the usefulness of 131-1 HSA in isotope cisternography in 100 patients with hydrocephalus (in collaboration with Dr. J.R.F. Fleming).

Renal Disease

Dr. G.A. deVeber (TWH): a study of renal osteodystrophy (with Drs. D. Oreopolous, A. Rapoport, G. Lloyd, S. Rabinovich, E. Meema); role of fluoride in renal osteodystrophy (with Drs. Oreopolous and others); immunosuppressive drug therapy in glomerulonephritis (with Dr. A. Rapoport); role of heparin in acute or progressive proliferative and glomerulonephritis (with Drs. Zweig, A. Rapoport); metabolism and excretion of labelled reserpine in hypertensive patients with normal and impaired renal function (with Drs. T. Zsoter and G. Johnson). Dr. M.D. Johnson (SMH): study of the mechanism of hydrogen ion excretion in Distal Renal Tubular Acidosis (with Dr. M. Halperin). Dr. D. Oreopolous (TWH): significance of fluoride on the development of renal osteodystrophy in patients maintained on chronic haemodyalysis; effective thiazides on calcifying ability of the urine from patients with idiopathic hypercalciuria; balance studies in patients with renal osteodystrophy (with Dr. A. Rapoport). Dr. D.R. Wilson (TGH): investigation of the pathophysiology of obstructive nephropathy in the rat; studies of the effects of thiazide diuretics in patients with kidney stones; study of patients with renal tubular acidosis. Dr. S.M. Zweig (TWH): study of haemodynamic changes involved in compensatory increases in renal function occurring after contralateral reduction of excretory function; studies of the effects of heparin on renal haemodynamic and excretory function in patients with impaired renal function.

Respiratory

Dr. R. Bladek (TWH): study of allergy to insects in man and effects of therapy. Dr. F. Douglas (SMH): investigation into the effects of obesity and weight reduction on the mechanical properties of lung; observations on the effects of foreign particle emoblism on respiratory function in narcotic addicts. Dr. S. Epstein (TWH): studies

into the reactivity of the bronchi to various inhaled drugs in asthmatics; clinical trial of salbutamol, a beta-2-adrenergic drug; clinical trial of carbenicillin in the treatment of acute lower respiratory tract infections due to *pseudomonas aeruginosa*. Dr. E.S. Lilker (SJH): a reproducible method for studying mucociliary transport *in vivo* has been established (using powdered tantalum); gas exchange through the bronchial circulation is being studied in a dog model; evaluation of single breath versus steady state diffusing capacity as a screening test for emphysema; study of the effect of long-term anticoagulants in patients with pulmonary emboli; controlled evaluation of portable oxygen in hypoxic cor pulmonale. Dr. C. Woolf (TGH): the effect of chronic cigarette smoking in women; investigation of the role of mechanical factors in the control of pulmonary arterial blood flow; investigation of carbon dioxide stores in patients after the ingestion of carbonated beverages.

Rheumatology

Dr. D.A. Gordon (WH): clinical and immunological studies of rheumatoid arthritis and related rheumatic diseases (in collaboration with Drs. I. Broder, Waldemar, Pruzanski, and Urowitz); microbiological, serological studies of patients with rheumatoid arthritis and related rheumatic disease in collaboration with Dr. A.E. Franklin. Dr. J.B. Houpt (NMS): studies of abnormalities of tryptophan metabolism in rheumatoid arthritis and scleroderma (in collaboration with Dr. M. Ogryzlo); studies of abnormalities of uric acid metabolism in patients with idiopathic hypercalciuria and calcium stone formation (with Dr. M.A. Ogryzlo). Dr. M.A. Ogryzlo (WH): tryptophan metabolism in connective tissue disease (with Dr. Houpt); uric acid and gouty nephropathy (with Drs. Houpt and Pruzanski); immunoglobulins in multiple myeloma and lymphomatous disease (with Drs. Pruzanski and Bergsagel); immunoglobulins in rheumatic disease (with Drs. Gordon, Ogryzlo and Pruzanski). Dr. W.J. Reynolds (TWH): study of synovitis of the hand, following patients with early disease and assessing better methods of measuring disease and deformities, and assessing the effects of treatment on synovitis. Dr. H.A. Smythe (WH): studies of uric acid metabolism. A sensitive method for the assay of HGPRT'ase has been developed; a technique of leukocyte glutaminase has been developed to assess the role of deficiency of this enzyme in the pathogenesis of urate overproduction; studies have been done on the effect of changing serum urate levels on the rate of urinary excretion of urate; studies of the effects of Sulphinpyrazone on morbidity and mortality from vascular disease (with Dr. J. Blakely); a double-blind control trial in effects of Imuran on rheumatoid disease (with Dr. M. Urowitz); population survey for prevalence of ankylosing spondylitis in B.C. Indians (with Dr. J.P. Gofton). Dr. M.B. Urowitz (WH): correlation of the presence of free DNA, anti DNA antibody, complement and other immunologic parameters in serum and synovial fluid with clinical activity in a prospective study of patients with systemic lupus erythematosus; a double-blind cross-over trial of azathioprine therapy in rheumatoid arthritis; study of the role of soluble complexes in the pathogenesis of connective tissue disease (with Dr. I. Broder).

HONOURS

Dr. C.H. Hollenberg, Visiting Professor, University of Manitoba.

Dr. E.A. McCulloch, Medical Research Council Visiting Professor, University of Alberta.

Dr. G. Steiner, President, Clinical Research Society of Toronto.

Dr. E.D. Wigle, President, Canadian Society for Clinical Investigation.

SCHOLARLY ADDRESSES

Dr. A.G. Adelman, "The Clinical Course in Muscular Subaortic Stenosis," Canadian Cardiovascular Society, Ottawa; "Arteriographic Evidence of Coronary Artery Spasm in Printzmental's Varient Form of Angina," Canadian Cardiovascular Society, Ottawa.

Dr. H.E. Aldridge, "Fascia Lata Valves and Prosthetic Valves," Academy of Medicine, Toronto.

Dr. R.E. Alison, "Cancer: A Brighter Outlook," Canadian Cancer Society Education Committee, Halifax Unit, Halifax.

Dr. A. Angel, "Reduction in Adipocyte atp by Lipolytic Agents: Relation to Intracellular Free Fatty Acid Accumulation," International Conference on the Biochemistry of Lipids, Lund, Sweden; "Cholesterol Storage in White Adipose Tissue," Eastern Section Meeting of the American Federation, Chicago: "Cholesterol Storage in White Adipose Tissue," American Heart Association Council on Arteriosclerosis, Atlantic City; "Storage of Cholesterol in White Adipose Tissue," Canadian Society for Clinical Investigation," Ottawa; "Regulation of Cholesterol Storage in White Adipose Tissue," American Society for Clinical Investigation, Atlantic City.

Dr. R.M. Armstrong, "Central Core Disease of Muscle," Canadian Neurological Society at their annual meeting at St. John's, Newfoundland; "*In Vitro* Assessment of Thymus Cells, Thymoma Cells and Circulating Lymphocytes in Myasthenia Gravis," 6th International Conference on Leukocyte Culture, Rosario, Washington.

Dr. D.E. Bergsagel, "Management of Plasma Cell Myeloma," American Society of Hematology 1970 Convention, Puerto Rico; "The Effectiveness of Melphalan Therapy, and a Consideration of Total Body Irradiation for Myelomatosis," Myelomatosis Workshop, London, England; "The Evaluation of the Effectiveness of Treatment of Multiple Myeloma," Roger Williams General Hospital Medical Seminar, Providence, Rhode Island.

Dr. B. Birchwood, "Lipids Following Acute Myocardial Infarction in Women; Incidence of Types iii and iv Hyperlipoproteinemia among 213 Patients with Elevated Lipids and Response to Therapy," Federation of Biological Societies, Toronto.

Dr. I. Broder, "Immunoglobulin Complexes in Serum and Synovial Fluid of Persons with Rheumatoid Arthritis," 3rd Canadian Congress on Research in the Rheumatic Diseases, Toronto; European Congress of Rheumatology, Brighton, England.

Dr. J.R. Brow, "Gastroscopy in Bleeding," American College of Surgeons Sectional Meeting, Montreal.

Dr. K.W.G. Brown, Arrhythmias and Heart Block in Acute Myocardial Infarction; Interpretation of Unusual Arrhythmias," International Symposium on Advances in Electrocardiography, Montreal; "Atrial Arrhythmias in Acute Myocardial Infarction Seminars on ecg Analysis," Symposium on Acute Coronary Care, American College of Cardiology, New York; "Prevention of Fatal Ventricular Arrhythmias in Acute Myocardial Infarction," Annual Scientific Session, American Heart Association, Atlantic City; "Recent Advances in Management of Dysrhythmias," Annual Scientific Session, Royal College of Physicians and Surgeons of Canada, Ottawa; "Acute Coronary Care," Annual Scientific Session, American College of Cardiology, Washington; "The Importance of the Coronary Unit on Mortality of Acute Myocardial Infarction," International Symposium on Atherosclerosis, Toronto.

Dr. D.H. Cowan, "The Bone Marrow Transplantation Program in Toronto," Symposium on Myelopoiesis and the Immune Response *in vitro*: Significance for Human Marrow Transplantation, Kingston; "Basic and Applied Approach to Human Bone Marrow Transplantation," Canadian Society of Microbiology, Toronto; "Human Bone Marrow Transplantation," Ontario Antibody Club, Toronto; "Bone Marrow Transplantation," Royal College Meeting, Ottawa.

Dr. D.R. Crapper, Neurofibrillary Tangles and Altered Electrical Activity," Department of Physiology, New York State University of Buffalo, Buffalo.

Dr. J. Crawford, "Venous Thrombosis after Fractures of the Upper End of the Femur – A Phlebographic Study of the Effect of Prophylactic Anticoagulation," Canadian Association of Physical Medicine and Rehabilitation, Saskatoon, Saskatchewan.

Dr. J.H. Crookston, "Hereditary Erythroblastic Multinuclearity with a Posi-

tive Acidified Serum Test," 13th International Congress of Hematology, Munich; "Antibodies in the Serum and on the Heart of Dogs with Cardiac Allografts," 3rd International Congress of the Transplantation Society, The Hague; "Rejection of Cardiac and Renal Allografts in Presensitized Dogs," Annual Meeting of the Canadian Society for Clinical Investigation and Royal College of Physicians and Surgeons, Ottawa; "Hemoglobin Structure and Function," St. Mary's Hospital, London, England; "Antibodies in Infectious Mononucleosis," Ontario Antibody Club, Toronto; "Delayed Hemolytic Transfusion Reactions; A New Look at Old Blood Groups," Pennsylvania Association of Blood Banks Annual Meeting, Harrisburg, Pa.; "Humoral Antibody in Canine Cardiac Allograft Rejection," 43rd Scientific Session of the American Heart Association, Atlantic City; "Hereditary Anemia with Multinuclear Erythroblasts," Fourth Annual Conference on the Clinical Delineation of Birth Defects, Johns Hopkins Hospital.

Dr. G. deVeber, "Comparison of Various Parameters in the Detection of Hyperparathyroidism in Renal Failure," Annual Meeting, Royal College of Physicians and Surgeons, Ottawa; "Immunological Mechanisms and Management in Renal Disease," Ontario Medical Association.

Dr. N.E. Diamant, "Computer Simulation of Intestinal Slow-Wave Frequency Gradient," American Gastroenterological Association Meeting, Boston; "Effect of Gastric Contractions on the Lower Esophageal Sphincter," Canadian Association of Gastroenterology, Ottawa.

Dr. S. Dubiski, "Allotypic Specificity as a Marker of Cells and Cell Receptors," 2nd International Convocation on Immunology, Buffalo.

Dr. J. Edmeads, "Headaches in Occlusive Cerebrovascular Disease," International Symposium on Headaches, Buenos Aires.

Dr. S.W. Epstein, "Clinical Trial of Carbenicillin in Acute Respiratory Tract Infections due to *Pseudomonas Aeruginosa*," The Ontario Thoracic Society.

Dr. C. Ezrin, "An Account of the Histophysiology of the Adenohypophysis," Pituitary Confederation, McMaster University, Dept. of Obstetrics and Gynaecology, Hamilton; "Pituitary Structure and Function," Kingston.

Dr. M.M. Fisher, "Ethionine Metabolism in the Perfused Rat Liver; Bile acid induced Cholestasis in Rats," Canadian Federation of Biological Societies, Montreal; "Ultrastructural Studies on the sinusoidal fat storing cells of liver," Canadian Association of Pathologists, Newfoundland; "Influence of Bile Acids on Biliary Secretion," Seventh International Congress of Electron Microscopy, Grenoble; "Bile Acid Induced Intrahepatic Cholestasis," Ontario Association of Pathologists; "Bile Acid Induced Cholestasis in the Rat," American Society for Cell Biology, San Diego; "Hepatotoxicity of Chenodeoxycholic Acid in Rats," American Association for the Study of Liver Diseases, Chicago; "Sex Difference in Bile Acid Metabolism in Rats," International Academy of Pathology, Montreal; "Sex Dependent Differences in the Bile Acids of Rats; Effect of Ethionine on Bile Acid Synthesis," Federation of American Societies for Experimental Biology, Chicago; "Sex Difference in Chenodeoxycholic Acid Metabolism in Rats," American Gastroenterological Association, Miami.

Dr. N. Forbath, "Studies on Myocardial Lactate Kinetics Using ^{14}C-Labelled L+ Lactate in Patients with Ischemic Chest Pain," 24th Annual Meeting, Canadian Cardiovascular Society, Ottawa; 43rd Annual Meeting American Heart Association, Atlantic City.

Dr. G.G. Forstner, "Surface Membrane Glycoproteins in the Intestine," American Gastroenterological Association, Boston; "Effect of Anti-inflammatory Agents in Intestinal Glycoprotein Synthesis," Canadian Association of Gastroenterology, Ottawa.

Dr. G.L.A. From, "Mild Diabetes with Excessive Proinsulin Secretion," Annual American Diabetes Association Meeting, San Francisco.

Dr. J.H. Goldie, "Cell Kinetic Applications in the Chemotherapy of Solid Tumours," Chest Beatty Research Institute, London, England,

Dr. D.A. Gordon, "The Extra-Articular Features of ra," Inter Urban Arthritis

Club, Pittsburgh; "Viral Antibody Studies in RA and SLE," IV Canadian Conference on Research in Rheumatic Diseases.

Dr. M.L. Halperin, "Role of the Cytoplasmic Redox Potential on the Control of Fatty Acid Synthesis," Symposium on Recent Research in Diabetes, Intermediary and Drug Metabolism, Omaha, Nebraska; "Control of Anion Transport in Rat Liver Mitochondria," VII International Congress of Biochemistry, Lausanne, Switzerland; "Reduction in Adipocyte ATP by Lipolytic Agents: Relation to Intra Cellular FFA Accumulation," 14th International Conference on the Biochemistry of Lipids; "Studies on the Control of Fatty Acid Synthesis in White Adipose Tissue," Canadian Society of Clinical Investigation, Ottawa; "Reduction in Adipocyte ATP Levels by Lipolytic Agents: Relation to Intracellular FFA Accumulation," Canadian Society of Clinical Investigation, Ottawa.

Dr. J.E. Harrison, "Neutron Dosimetry with Nuclear Track Detectors Applied to *In Vivo* Neutron Activation Analysis," Health Physics Society, Chicago; "A Study of Calcium Binding Proteins in Human and Animal Small Bowel Mucosa," Franklin C. McLean Commemorative Workshop Conference on Cellular Mechanisms for Calcium Transfer and Homeostatis, Wentworth, New Hampshire; "Examination of Human Small Bowel Mucosa for Calcium Binding Protein," Canadian Society of Clinical Investigation, Ottawa.

Dr. G.D. Hart, "The History of Medicine Relating to Numismatics and Archaeology," University of Mississippi, University of Georgia, University of Florida, University of Louisiana, Visiting Lecturer, American Institute of Archaeology; "Adult Acute Leukemia – Current Management – Some Controversial Aspects," Section of Cancer, Academy of Medicine.

Dr. H.P. Higgins, "Two Cases of Severe Thyrotoxicosis due to Hydatidiform Mole," Fourth Asia and Oceania Congress of Endocrinology, Auckland, New Zealand.

Dr. H. Haberman, "Serum Tyrosinase in Melonoma Bearing Animals," XI International Cancer Congress.

Dr. M.E. Hill, "L-dopa: Its Place in the Management of Extrapyramidal Disease," Annual Meeting, Ontario Medical Association.

Dr. J.B. Houpt, "Tryptophan Metabolism in Man," Fourth Canadian Conference on Research into Rheumatic Diseases, Toronto; "Tryptophan Metabolism in Rheumatoid Arthritis and Scleroderma; Review of Biochemical Abnormalities in Scleroderma," VII European Rheumatology Congress, Brighton, England.

Dr. C.H. Hollenberg, "Regulation of Adipose Tissue Mass," Merck Frosst Research Laboratories Symposium, Kirkland, Quebec; "Adipose Tissue Control of Triglyceride Assimilation and Free Fatty Acid Release," International Symposium on Atherosclerosis, Toronto.

Dr. J.G. Humphrey, "Spinal Muscular Atrophy in Young Adult Males," 5th Canadian Congress of Neurological Sciences, Toronto; "Diabetic Neuropathies," 4th Annual Hoeschst Symposium on Diabetes, Mont Gabriel, Quebec; "Inherited Muscle Disorders," International Symposium on Malignant Hyperthermia, Toronto.

Dr. K.N. Jeejeebhoy, "Nutrition in Clinical Gastroenterology – The Role of Hyperalimentation," Academy of Medicine, Toronto; "Intravenous Alimentation," Annual Meeting, Canadian Pharmaceutical Association.

Dr. A. Knight, "Thymic Dysplasia and Progressive Multifocal Leukoencephalopathy," International Congress of Allergology, Florence, Italy; "Control of Immunological Response in Allergy," 12th Annual Forum on Allergy.

Dr. J.C. Laidlaw, "Hypertension and Hypokalemia," Queen's University, Kingston; "Hypertension and Hypokalemia, Symposium on Advances in Endocrinology, Royal College of Physicians and Surgeons of Canada, Ottawa.

Dr. R.G. Lee, "The Myasthenic Syndrome of Lambert-Eaton; Clinical and Electromyographic Study of Two Cases," Canadian Congress of Neurological Sciences.

Dr. M.M. Lenczner, "Problems in Diagnosis and Management in Typhoid

Carriers, Imported from Endemic Areas; Pharmacodynamic and Metabolic Effects of Niridazole on Schistosomes in Diagnosis of Bilharziasis," 5th International Congress for Infectious and Parasitic Diseases, Vienna; "Host-Parasite Relationship and Tissue Response in Tropical and Parasitic Diseases," International Society of Tropical Dermatology, New York; "Typhoid Fever Imported; Some Aspects of Bilharziasis," Second All Canada Meeting on Tropical and Parasitic Diseases and Health, Ottawa; "Amoebiasis," Missionary Health Institute.

Dr. E.S. Lilker, "The Use of Powdered Tantalum in Chest Diseases," Upstate Society of Thoracic Surgeons, Toronto; "Cigarette Smoking by Young People," Northumberland-Durham TB and RD Association, Cobourg; "Tantalum Particle Clearance from the Airways of Dogs; Gas Exchange Through the Bronchial Circulation," Annual Meeting of Canadian Thoracic Scientific Session.

Dr. J.A. Little, "Diagnosis of Early Diabetes," Armed Forces Institute, Toronto; "A Case of Type I Hyperlipoproteinemia Unusually Sensitive to Dietary Alcohol and Fat with Induction of Lipemia," Ottawa; "Influence of Diet and Diet Plus Clofibrate on Serum Lipids of 96 Outpatients with Primary Hyperlipoproteinemia," Royal College of Physicians and Surgeons of Canada, Ottawa; "Interrelationship between the Kinds of Dietary Carbohydrate and Fat in Hyperlipoproteinemic Patients," International Symposium on Atherosclerosis, Toronto; "Effect of Alcohol Ingestion on Serum Lipids and Lipoproteins in Patients with Primary Hyperlipoproteinemia," Toronto; "A Preliminary Report on the Induction of Immunotolerance to Beef Lente Insulin in Human Diabetics Pretreated with Maleyl Insulin," The Canadian Federation of Biological Societies, Toronto.

Dr. W.A. Mahon, "The Clinical Value of Serum Digoxin Measured by Radioimmunoassay in the Diagnosis of Digitalis Intoxication," Canadian Cardiovascular Society.

Dr. E.A. McCulloch, "Hemopoietic Cellular Differentiation: A Problem at the Interface Between Biology and Medicine," Queen's University, Kingston; "Regulatory Mechanisms acting on Hemopoietic Stem Cells: Some Clinical Implications," Federation of American Societies for Experimental Biology.

Dr. W.J. McIlroy, "Current Research in Multiple Sclerosis," Multiple Sclerosis Society of Canada, Ontario Division.

Dr. J.E. Morch, "Studies of Myocardial Lactate Kinetics Using ^{14}C Labelled L+ Lactate in Patients with Ischemic Chest Pain," 43rd Scientific Sessions, American Heart Association; "Hemodynamic Effects of Alprenolol in Patients with Heart Disease," 43rd Scientific Sessions, American Heart Association; "A Study of Left Anterior Descending Coronary (LAD) Obstruction and Measurements of its Blood Flow," VI World Congress of Cardiology, London.

Dr. S. Murray, "The 'hot' Thyroid Nodule," Section of Nuclear Medicine, Ontario Medical Association, Toronto.

Dr. M.A. Ogryzlo, "Management of Gout," V Panamerican Congress on Rheumatic Diseases, Montevideo, Uruguay; "Lysozyme (Muramidase) in Rheumatoid Arthritis," 4th Canadian Conference on Research in Rheumatic Diseases, Toronto; "Epidemiology of Rheumatic Diseases in North America," V Panamerican Congress on Rheumatic Diseases, Montevideo, Uruguay; "Audio-visual Aids in Teaching of Rheumatic Diseases," V Panamerican Congress on Rheumatic Diseases, Montevideo, Uruguay; "Serum and Synovial Fluid Proteins in Rheumatic Diseases," 4th Canadian Conference on Research in Rheumatic Diseases, Toronto; "Tryptophan Metabolism in Rheumatoid Arthritis and Scleroderma," 4th Canadian Conference on Research in Rheumatic Diseases, Toronto.

Dr. D.A. Osoba, "Cellular Cooperation in the Immune Response," Roswell Park Memorial Institute, Springville Laboratories, Springville, New York; "Recent Work on Cellular Interaction in the Immune Response," L'Institut de Cancérologie et d'Immunogénetique, Hôpital, Paul-Brousse, Villejuif, France; "Studies on the Immune Response in Cell Culture," Sir William Dunn School of Pathology, University of Oxford, Oxford, England; "The Cellular Basis of Immunity," Memorial University, St. John's, Newfoundland; "Current Status of Cellular Interaction in the Im-

mune Response," The Manitoba Antibody Club, Winnipeg; "Characteristics of Cells Involved in the Immune Response," Queen's University, Kingston; "The Immune Response," Toronto Institute of Medical Technology, Toronto.

Dr. J.F. Paterson, "Silicosis in Ontario Miners," Medizinische Institut für Lufthygiene und Silicoseforschung, Düsseldorf, West Germany.

Dr. A. Rapoport, "The Kidney in Diabetes," The Hoechst Workshop on Diabetes, Mont Gabriel, Quebec; "Renovascular Hypertension," Hebrew University Medical School, Jerusalem, Israel; "Hyperparathyroidism," University of Athens, Athens; "Curable Hypertension," Helenic Society of Nephrology, Athens.

Dr. J.C. Richardson, "Rehabilitation after Industrial Head Injury," International Conference on Head Injuries, Edinburgh and Madrid; "Intracranial Haemorrhage," Regional Meeting, Royal College of Physicians and Surgeons, Charlottetown.

Dr. J. Senn, "Cell Culture of Human Marrow," Academy of Medicine, Toronto; "Cell Culture of Human Marrow in Leukemia," Queen's University, Kingston.

Dr. H.A. Smythe, "Renal Response to Varying Plasma Urate," 4th Canadian Conference on Research on Rheumatic Diseases; "Advances in Therapy of Gout," National Defence Medical Centre; "An Analysis of the Renal Response to Varying Plasma Urate Concentration," American Rheumatism Association.

Dr. G. Steiner, "Peripheral Sympathetic Ganglia in Brown Adipose Tissue – Pharmacologic Evidence," American Physiological Society, Atlantic City; "Effect of Thyroid Status on Brown Fat (bf) Metabolism," Canadian Physiological Society, Montreal; "The Nature and Origin of the Lipoprotein Abnormalities in Diabetic Dogs," Central Society for Clinical Research, Chicago; "The Development of Chylomicron-Like Particles Containing Endogenous Lipid in Pancreatectomized Dogs," Canadian Diabetes Association, Ottawa; "Brown Adipose Tissue, a Tool for the Study of Ganglion Active Drugs," Canadian Society for Clinical Investigation, Ottawa; "Recent Developments in Diabetes – Fat and Fantasy," Canadian Diabetes Association, Winnipeg; "Clinical Disorders of Lipoproteins," Muskoka Medical Association, Bracebridge; "Lipoprotein Abnormalities in Experimental Diabetes," New York Medical College; "Acetic Thiokinase, a Possible Regulatory Enzyme in Liver," American Physiological Society, Chicago; "Immunosympathectomy, a Method to Study the Neural Control of Adipose Tissue Metabolism," Symposium of the International Union of Biochemistry and The Physiological Society – Nerve Growth Factor and Its Antiserum, London, England.

Dr. J.N. Swanson, "Audiovisual Systems and Instructional Media Organizations in Canada," Conference on Audiovisual Aids in Medical and Allied Health Sciences, Washington; "Canadian Experience with Medical Teaching Aids," National Heart and Lung Institute, National Institutes of Health, Bethesda, Maryland; "Report on Developments in Canada in Instructional Media," Conference on Audiovisual Aids in the Medical and Allied Health Sciences.

Dr. M.B. Urowitz, "A Prospective Study of the Rheumatoid Biologically Active Factor (rbaf) – the Second Assessment," Annual Meeting of the American Rheumatism Association, Detroit; "Spondylodiscitis: An Unusual Feature of Ankylosing Spondylitis," Annual Meeting of the American Rheumatism Association, Detroit; "Immunoglobulin Complexes in Serum and Synovial Fluid of Persons with Rheumatoid Arthritis," Fourth Canadian Conference on the Rheumatic Diseases, Toronto; "A Prospective Study of the Rheumatoid Biologically Active Factor – The Second Assessment," Society for Clinical Investigation and Royal College of Physicians and Surgeons Annual Meeting, Ottawa; "Azathioprine Treatment of Rheumatoid Arthritis – A Double Blind Crossover Study," American Rheumatism Association Annual Meeting, New York.

Dr. D.P. Varadi, "Role of Elastase in the Pathogenesis of Connective Tissue Diseases," Fourth Canadian Conference on Research in the Rheumatic Diseases, Toronto.

Dr. P.G. Walfish, "Current Concepts in the Treatment of Obesity," Annual Meeting of the Canadian Dietetic and Canadian Home Economics Association, To-

ronto; "The Effect of Propranolol on Tolbutamide Metabolic Responses in Thyrotoxic Humans," Scientific Program of the Eastern Sectional Meeting of the American Federation of Clinical Research, New York; Scientific Program of the Annual Meeting, Canadian Society for Clinical Investigation, Ottawa, Toronto Diabetes Association.

Dr. B. Webster, "Preparations of Human Thyrotropin: Comparative Stability of Biological and Immunological Potencies," Sixth International Thyroid Conference, Vienna; "The Antiduretic Effect and Complications of Chlorpropamide Therapy in Diabetes Insipidus," University of Basle, Switzerland; "Isoelectric Focusing of Human Thyrotropin: Identification of Multiple Components with Dissociation of Biological and Immunological Activities," McGill University Clinic, Royal Victoria Hospital, Montreal.

Dr. E.D. Wigle, "Pathophysiologic Considerations in Muscular Subaortic Stenosis," CIBA Foundation Group on Hypertrophic Obstructive Cardiomyopathy, London, England; "The Myocardial Disorder in Hypertrophic Obstructive Cardiomyopathy," 6th World Congress of Cardiology, London, England; "Muscular Subaortic Stenosis," King Paul Hospital, Athens; "His Bundle Electrograms in Bundle Branch Block," American Heart Association Meeting, Atlantic City; "His Bundle Electrocardiography," Canadian Cardiovascular Society Meeting, Ottawa; "Practical Assessment of Myocardial Contractility," Royal College of Physicians and Surgeons of Canada, Ottawa and Essex County Academy of Medicine, Windsor.

Dr. C.R. Woolf, "Oxygen is Good," xiii Annual Scientific and Business Meeting of the Ontario Chapter of the College of Family Physicians of Canada, Toronto; "Asthma," xiii Annual Scientific and Business Meeting of the Ontario Chapter of the College of Family Physicians of Canada, Toronto; "Management of a Respiratory Care Unit; The Treatment of Acute Respiratory Failure in Patients with Chest Disease," Third Annual Inhalation Therapy Conference, University of Michigan, Ann Arbor; "Rehabilitation and Chronic Obstructive Lung Disease," Canadian and American Society for Sports Medicine, Toronto; "Rationale and Methods of Oxygen Therapy," 1971 Annual Meeting of the Ontario Medical Association, Toronto.

Dr. J.R. Wherrett, "Chemistry of Red-Cell Glycolipids," Symposium on Biochemistry and Function of Glycosphingolipids, 160th National Meeting of the American Chemical Society, Chicago; "Cerebral Lipidosis of Late Onset," Canadian Congress of Neurological Sciences, Toronto.

Dr. C.W. Wyse, "Common Dermatoses and Their Treatment," Grace Hospital, Toronto.

Dr. D.M. Young, "Multichemical Screening," Occupational Health Conference of Ontario and Quebec; "The Biological Bases for Organizational Chaos in the Applied Arts," Queen's University, Kingston.

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OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor J.L. Harkins

Two emeritus members of the staff, Drs. H.W. Johnston and W.T. Noonan, died during the past year. These two men served the Department for many years with loyalty and distinction. We wish to express to their wives and families our deepest sympathy.

Teaching of Reproduction and Neonatology in conjunction with the Department of Paediatrics – Period IIc – was carried out for the first time during this year. Our impression was that it was well received by the students, and staff approached it with considerable interest and enthusiasm. The high teacher-student ratio demanded of such a training programme required that many of the hospitals bring in associate members of their staff to assist. The response of these volunteers was excellent and they provided many hours of fine clinical teaching for our students. Another of the problems encountered was providing suitable patient material at the right time for the students as they passed through the programme. Further evaluation will have to be given to the merits and deficiencies of this type of programme in the next years.

Period III, the clinical clerkship, is now being offered at each of the major teaching hospitals with the exception of Sunnybrook. Problems unique to our speciality are being recognized and hopefully dealt with successfully. Our early experience with the clerkship has been generally encouraging, but a full, constant evaluation and revision of the programme must be carried on. Our students obtained the highest marks in obstetrics and gynaecology on the Medical Council of Canada exams when compared with nine other Canadian university centres.

Dr. William Paul, former Chairman of the Department, has accepted the position of Obstetrician and Gynaecologist-in-Chief of the Toronto Western Hospital and Dr. Frederick Papsin has become Obstetrician and Gynaecologist-in-Chief of the New Mount Sinai Hospital. These appointments represent the first time that full time people have been appointed to these positions. To Dr. Paul and Dr. Papsin, our sincere best wishes for a long and successful career.

Dr. Carol Cowell has returned from abroad and with the assistance of the Canadian Life Insurance Association joined our staff. Dr. Cowell is the first one in our Department to have a full cross appointment with the Department of Paediatrics at the Hospital for Sick Children. She will undertake studies in Adolescent and Paediatric Gynaecology. Dr. Goran Enhorning of the Karolinska Institute in Stockholm has decided to move to Canada and will join our Department in the summer of 1971. Dr. Enhorning is widely known for his outstanding research and clinical activities. I anticipate that Dr. Enhorning, who will be on the staff of the Toronto Western Hospital, will enrich our Department greatly.

I am pleased to announce other additions to our staff. Dr. Bruce Thomas and Dr. John Taylor joined the staff of Clinical Teachers at the Women's College Hospital; Dr. A. Addison at St. Michael's Hospital, and Dr. Charles Gold at the Toronto General Hospital. Dr. P.L. Chan, a former fellow in the Department, has been appointed an associate at Sunnybrook Hospital.

In the past year, Dr. T.M. Roulston, Professor and Chairman of the Department of Obstetrics and Gynaecology of the University of Manitoba, visited the Department and spent some time with students and residents in addition to giving the Marlow Lecture at the Toronto Academy of Medicine. Dr. Goran Enhorning of the Karolinska Medikokirurgiska Institutet, Stockholm, Sweden, was the Henderson Lecturer 1970.

We are pleased to acknowledge a major research grant from the Ford Foundation to Dr. Rudi Borth and Dr. C.A. Woolever to enable them to continue their research in the timing of ovulation and other aspects of the physiology of reproduction.

Dr. Richard Wilson continues as Director of the Health Sciences Functional Planning Unit. During the past year Dr. Wilson and his wife, who is a member of our Family Planning Group, visited Kenya, Uganda, Nigeria, Ghana, and Senegal to survey Family Planning operations in these developing countries.

I had an opportunity to attend the Zone Conferences for physicians and nurses working at Sioux Lookout in this past winter. While there I visited several of the outpost nursing stations. University activity in this area is viewed as a major opportunity to study problems of health care delivery system and I hope that our Department will become increasingly active in this development.

In the past year, many members of the Department have spent a considerable amount of time speaking and participating in panels of a wide variety of lay and religious groups. In our particular specialty there is considerable discussion by people in the community on subjects related to Population Control, Family Planning, Abortion, and Human Sexuality. The efforts of our Department, we feel, are useful in this community service to assist in providing information for concerned members of our society.

In this, my first year of chairmanship in the Department, I wish to express my thanks to my colleagues and to the University administration for their loyalty and assistance in this new and challenging venture.

RESEARCH

Dr. P.F. Beirne: Research activities during the past year have continued in the area of Ultra-Sound as a diagnostic aid in Obstetrics and Gynaecology. Ultra-Sound has been incorporated into the high-risk pregnancy clinic and intra-uterine growth retardation by serial biparietal measurements is being studied.

Dr. R. Borth: Radioimmunoassay of gonadotrophins – parameters, kinetics,

theoretical models – was continued. Research was continued also in methodological problems in the assay of blood steroids by competitive protein binding. Study of sex hormone blood levels in the menstrual cycle was continued as well as sex hormone blood levels in disturbances of ovarian function. Component analysis in the radio-immunoassay of gonadotrophins was continued. Effect of intravenous estrogen on postmenopausal levels of FSH and LH in serum was continued.

Dr. S.L. Cohen continued with studies on relationship between "labile" estrogens and diabetics. It is hoped to have a gas chromatogram set up soon so that the chemical nature of the "labile" estrogens that appears in such large amounts in some diabetic urines can be determined. We have fractionated some 500 L normal urine through Sephadex, and have 1st 150 L batch diabetic urine running through. We have isolated one crystalline compound from the normal urine.

Dr. J.R. Colwill assisted in the project concerned with the detection of ovulation in sheep. He also gained a knowledge of the laboratory work required in the competitive protein binding assay of progesterone, estrone, and estradiol.

Dr. Carol A. Cowell worked on the preliminary organization and establishment of a clinical investigative project involving a study of the phenomena of puberty, assessed by various anthropometric, endocrine, and radiologic parameters.

Dr. T.A. Doran was involved in endometrial cytology study. This study continues with over 1000 patients in the series now. The place of endometrial lavage in the gynaecological diagnosis is being reviewed and we will be reporting on our overall experience. Studies with Dr. P. Conen, H.S.C., on amniotic fluid cytogenetics continue. A number of genetic high risk pregnancies have been studied by amniocentesis. One particular group, carriers of Tay Sachs disease, have been studied by amniocentesis in conjunction with Dr. J.A. Lowden, H.S.C. An extensive study of amniotic fluid biochemistry is beginning with special emphasis on A.F. proteins, and phospholipids.

Dr. D.J. Gare: Clinical investigation utilizing foetal heart rate patterns and uterine monitoring was continued in the labour suite.

Dr. C.C. Gold: A programme of ovulation stimulation using gonadotrophins has been established.

Dr. J.W. Goodwin: In conjunction with Dr. J.E. Milligan, studies on the chemo-receptor control of the foetal circulation in the lamb have been continued. With Dr. W.A. Mahon, a preliminary study of digoxin transfer to the foetal lamb, using a radio immunoassay method for the measurement of digoxin in blood, is currently being performed in the Division of Clinical Pharmacology, Toronto General Hospital. Together with Mr. F.W. Unger (biomedical engineer at Women's College Hospital), the design and development of a new scalp electrode clip and radio-telemetry system for monitoring foetal electrocardiography and intra-amniotic fluid pressure during labour in high risk pregnancies was undertaken.

Dr. J.E. Milligan's basic research activities were concerned with the effect of drugs on the ability of newborn rabbits to withstand anoxia. Research in foetal physiology with respect to renal circulation was also carried out.

Dr. J.E. Morgan continued to study the normal and abnormal function of the female genito-urinary tract, with emphasis on development of techniques of pre-operative assessment and the correlation of these with presently available methods of investigation. In conjunction with the Department of Urology, he studied urinary tract infection in women. Development of laparoscopy technique for teaching and improvement in surgical methods was also investigated. An anatomy study with Dr. Ross MacKenzie into the possible use of cadaver material for teaching basic gynaecological-surgical techniques was carried out.

Dr. L.W. Organ studied the use of the principle of Doppler ultra-sound in the analysis of foetal heart activity, spectral analysis at the ultra-sound signal, and correlation with the elctrocardiogram.

Dr. F.R. Papsin investigated colposcopy and the abnormal Pap smear, and chemotherapy in ovarian malignancy.

Dr. T.G. Ryley is continuing the research activity in the Chromosome Labo-

ratory at the Wellesley Hospital. Recently, attempts have been made to grow amniotic fluid cells and to perform chromosome analysis.

Dr. S.M. Tobin in his animal experiments is using armadillos as the experimental animal in an effort to produce chorio carcinoma. Thalidamide and benzpyrene were administered in the early stages of pregnancy. The basic aim is to try to reproduce a hydatidiform mole in the armadillos. To date we have administered varying doses of thalidamide to 15 armadillos and have only produced spontaneous abortions. This work and other aspects of the reproductive cycle of the male and female armadillos will be investigated in the following year. In the study of organ cultures, chorionic tissue has been obtained from therapeutic abortions either at suction curettage or at hysterotomy. Chorionic tissue has been maintained for 72 days. An attempt has been made to produce hydatid-type changes in the chorionic villi by using X-ray thalidamide and benzpyrene.

Dr. J.H. Whiteside, with the assistance of a nurse-technician, is continuing work in the area of high risk pregnancies and in particular on the effect of epidural anaesthesia on the fetus. The criteria used include: continuous foetal heart rate monitoring and pH where indicated, as related to uterine activity.

SCHOLARLY ADDRESSES

Dr. M.L. Bunker, "Adolescent Gynaecological Malignancies," presented at Section of Obstetrics and Gynaecology, Academy of Medicine, Toronto, February 1971.

Dr. S.L. Cohen, "Excretion of Estrogens by Pregnant Diabetic Women," at 3rd International Congress on Steroidal Hormones, Hamburg, Germany, September 1970; "Some Applications of Ammonium Sulphate Precipitation to Studies of Estrogen Metabolism," to Department of Clinical Science, University of Bonn, Germany, September 1970; "The Excretion of Estrogens by Pregnant Diabetic Patients," to Clinical Science Division at University of Toronto, May 1971; "The Rapid Isolation of Large Amounts of Sodium Estriol Glucosiduronate (NaEG) or Estriol Glucosiduronic Acid (EG)," at meeting of American Society of Biological Chemists in San Francisco on June 1971.

Dr. J.R. Colwill, "Infertility – The Ovarian Factor," University of Toronto, Department of Obstetrics and Gynaecology, Refresher Course for Specialists, March 1971.

Dr. Carol A. Cowell, "The Technique of Laparoscopy in Gynaecology," General Practice Refresher Course, March 1971; "Endocrinological Problems of Adolescents," acog Meeting, San Francisco, May 1971; "Young People – Who Are They?" Registered Nurses Association of Ontario, Second Conference; "The Impact of Adolescent Sexuality on Health Care Services," Adolescent Week, Hospital for Sick Children, June 1971; "Teenagers, Drugs and Pregnancy," sogc Annual Meetin, Halifax, June 1971.

Dr. T.A. Doran, "Therapeutic Abortion Toronto General Hospital 1970," to Welland County Medical Society, March 1971; "Management of High Risk Pregnancy," to Ontario Medical Association Annual Meeting, Toronto, May 1971.

Dr. W.J. Hannah, "Voluntary Sterilization," "Perinatal Intensive Care," "Management of PreEclampsia," "Women's Liberation Movement," all delivered to Thunder Bay Medical Society at Lakehead University, Thunder Bay, September 1970; "The Pill: Current Views," "Use of Hormones in Pre-Menopausal Women," both presented to Annual Meeting Ontario Chapter, College of Family Practice, Toronto, October 1970; "Abortion – Attitudes and Alternatives," to Registered Nurses of Ontario and Ontario Hospital Association, Toronto, May 1971.

Dr. J.L. Harkins, "The Management of Patients with Toxaemia of Pregnancy," "Amniotic Fluid: A Look at Future Research in Obstetrics," both delivered at Zone Conference, Sioux Lookout Hospital, March 1971; "The Management of Prolonged Labour," "Amniotic Fluid – Its Role in Evaluation of the Fetus at Risk and in Genetic Counselling," both at Ontario Medical Association District Meeting, North Bay, April 1971.

Dr. J.E. Milligan, "Renal Circulation as Modified by Chemo-receptor Stimulation in the Fetal Lamb," at Society of Obstetricians and Gynaecologists of Canada Meeting, Halifax, June 1971; "Fetal Monitoring During Pregnancy," to Registered Nurses' Association of Ontario, Toronto, May 1971.

Dr. J.E. Morgan, "A Marlex Urethral Sling – A Combined Urological and Gynaecological Approach to the Problem of Recurrent Stress Incontinence," at Quebec City; "A Surgical Approach to Urinary Incontinence," to the Obstetrical Section of the Manitoba Medical Association, Winnipeg, February 1971.

Dr. F.R. Papsin, "The Early Detection of Gynaecological Malignancy," to (i) Canadian Cancer Society, March 1971; (ii) Beth Shalom Cancer Forum, April 1971; "Colposcopy as an Aid," "The Abnormal Pap Smear in Pregnancy," to the Specialists Refresher Course, March 1971.

Dr. W.M. Paul, Praelector to the University of Dundee in October 1970; Visiting Professor to Queen's University, Kingston, April 1971; "Financing of Undergraduate Education in Ontario," to Association of Professors of Gynaecology and Obstetrics, New Orleans, March 1971.

Dr. G.I. Urbach, "Foetal-Maternal-Placental Immunological Relationships," to Department of Obstetrics and Gynaecology, University of Chicago.

Dr. J.H. Whiteside, "Management of Labour in High Risk Pregnancies," to the Annual Clinical Day, Hospital for Sick Children, November 1970; "Coagulopathies in Toxaemia of Pregnancy," to the Toronto Society of Obstetricians and Gynaecologists, February 1971; "Methods of Administration of Oxytocin," to the Specialists Refresher Course, March 1971; "Delivery and Immediate Management of the Newborn Infant in High Risk Pregnancies," at the Ontario Medical Association Annual Meeting, May 1971.

Dr. Richard Wilson, "Systems Research Techniques in Long-Range Planning," to Faculty of Medicine, University of Vermont, December 1970; "Computer Programming in Medical Education," to Faculty of Medicine, University of Ottawa, January 1971; "Bringing the Community into Health Care Planning," at School of Architecture, Carleton University, Ottawa, January 1971; "The Application of Systems Analysis to Health Sciences Educational Planning," to Pan-American World Health Organization, Washington, D.C., February 1971; "Advanced Program in Health Services Organization and Administration," to School of Hygiene, University of Toronto, March 1971; "Biomedical Research – An Asset or Impediment to Health Care?" at Clinical Research Society of Toronto Annual Meeting, May 1971.

PUBLICATIONS

Borth, R. "Chorionic Gonadotrophin"; in *Endocrinology of Pregnancy*, edition 1, pp. 16–31. New York: Harper & Row, 1971.

——— "A Graphical Method for the Component Analysis of Binary Hormone Mixtures: Dissimilarity of Pituitary and Urinary Gonadotrophins in Radioimmunoassay" (*Acta Endocrinologica*, vol. 66, 1971, pp. 111–21).

——— "Kinetics of Double-antibody Radioimmunoassay Systems for Human Gonadotrophins" (*ibid.*. vol. 65, 1970, pp. 453–8).

——— "Note on Assay Sensitivity" (*ibid.*, supplement 147, 1970, pp. 32–6).

Borth, R. *et al.* "Corrélations entre la cytologie vaginale et les dosages hormonaux dans les béances de l'isthme traitées par cerclage au cours de la gestation" (*Gynaecologia*, vol. 168, 1969, pp. 145–50).

Borth, R. (with Young, P.) "Assay Method for the Simultaneous Estimation of Unconjugated Oestradiol, Oestrone, Progesterone and Testosterone in 5 ml of Plasma" (*Acta Endocrinologica*, supplement 147, 1970, pp. 166–70).

Cohen, S.L. "The Conjugated Estrogens: A New Fractionation. Procedure Suitable for Large Volumes of Urine. A, Normal Pregnancy Urine" (*Steroids*, vol. 17, 1971, p. 155).

——— "Excretion of Estrogens by Pregnant Diabetic Women" (*Excerpta Medica International Congress*, series no. 210, 1970, p. 210).

Colwill, J.R. "Insulin-induced Hypoglycemia in the Ovine Fetus in Utero" (*Endocrinology*, vol. 87, 1970, p. 4).

Urbach, G.I. "*In vitro* Antigenicity of Trophoblast" (*American Journal of Obstetrics and Gynaecology*, vol. 109, 1971, pp. 7, 8).

Wilson, R. "Bringing the Community into Health Care Planning: A Systems Approach"; in *Proceedings of the Conference, National Seminar on Computer Application in Planning and Design of Health Facilities: Ottawa, June 1970.* June, 1971.

——— "Effective Planning for Health Sciences Education"; in *Proceedings of the Conference on Information Systems for the Health Sciences Center, State University of New York at Stony Brook, April, 1970.* January 1971.

OPHTHALMOLOGY

Under the direction of Professor Clement McCulloch

The integration of the ward and clinic work in the various teaching hospitals with instructions to Period III students has now been under way for two academic sessions. It has been found that undergraduate students are not sufficiently advanced to participate fully in service to patients. In each hospital the approach of the staff to the problem has varied; however, the general pattern has developed to have didactic teaching sessions for part of the time the students are available, the rest of the time being left for observation of the pattern of practice as it goes on. It is felt that those students who care to mix in with the daily work gain some insight into the specialty; those who do not gain a limited academic background of the subject.

The graduate programme has taken a large part of the teaching energies of the staff, and is evolving continually. The system of regular tests during the three years has been softened. With the advent of more multiple-choice examinations, the necessity of preparation for examinations has decreased, or at least has changed. Our in-course testing has also changed. One significant step is the use of the Resident in-service Testing Program put on by the American Academy of Ophthalmology. Our residents have rated well in comparison with other residents across America. Another change has been the shift of the home study programme to project assignments of a learning nature. The Department continues to give a full programme of lectures, laboratory and animal operating sessions, rounds and conferences for each of the three years in the graduate programme. This amount of formal instruction may or may not be accompanied by equivalent learning. However, it is felt that the subject matter is of sufficient breadth that it cannot be gained by any one person as an individual experience, and a formal presentation of the basis of the specialty is necessary.

The first year of the graduate programme is centred at the University departmental laboratories. The students are given a comprehensive course in the fundamentals of ophthalmology, particularly the basic sciences. They are examined as they progress. They are also asked to undertake one problem, usually of a basic science nature, and to present the results of this study at the annual spring departmental meeting. Finally, they have some service commitments: to the Eye Bank, to ophthalmic pathology, for refractions in the teaching hospitals, which gives a background for the second and third year.

The second and third years are occupied with service commitments in the hospitals. The pressure for service is heavy and continuous, and is the daily occupation of all the staff and students of the Department. If the student has made the most of his first study year, then the study service load of clinical ophthalmology in the second year and surgery in the third year leads him naturally to becoming a well-rounded ophthalmologist, with depth of judgment – a person able to take immediately a firm role as a practitioner in the province. This seems to be the quality of our graduates, who perform about half of the service of ophthalmology in Ontario.

The following first year men were supported through the Dean's Miscellaneous Fund: Dr. Kenneth Axmith, Toronto, Dr. J.J. Hurwitz, Toronto, Dr. I. Melnyk, Lwow, Ukraine, Dr. Richard D. Merritt, Toronto, Dr. Priroj Migasena, Bangkok, Thailand, Dr. Robert F. Stevenson, Victoria, B.C., Dr. Jon W. Waisberg, Toronto, Dr. John C. Walters, Stourbridge, Worcester, England.

The second year men rotating through the teaching hospitals were: Dr. F. De

Freitas (Hamilton), Dr. J.H. Fowler, Dr. Margaret W. Green, Dr. I. Kamel, Dr. M.S. Mandelcorn, Dr. Malcolm J. McLean, Dr. W.A. Nash, Dr. Arporn Prompitak, Dr. D.G. Stewart, Dr. H. Tanzer.

The residents in the final year of the programme were: Dr. D.M. Anderson, Dr. T.P. Fejer, Dr. D.M. Jamieson, Dr. A.L. Maberley, Dr. W.G. Macrae, Dr. F. Simon, Dr. Anne Simpson (Hamilton), Dr. A.L. Townsend (Hamilton), Dr. L.D. Kuhn (St. Joseph's).

The Department assists St. Joseph's Hospital, Toronto, the Hamilton General and St. Joseph's Hospitals, Hamilton, in their teaching programmes. The second year men on those programmes were: Dr. F. De Freitas and Dr. J.R.C. Todd. The third year individuals were: Dr. Anne Simpson, Dr. A.L. Townsend, and Dr. L.D. Kuhn. These start their first year as fellows in the Department at the University and return in their second and third year to the University for many lectures and ward rounds.

We welcome Dr. Gordon Johnson, who has joined the staff and the Department at St. Michael's Hospital. His particular interest is cornea and corneal transplantation.

Dr. J.R. Buncic has been working with Dr. J.M. Frederickson of the Department of Otolaryngology in the field of nystagmography. Dr. W.S. Dixon has been spending a year at the Eye Institute, and Moorefields Eye Hospital, London, working in the field of cornea and external diseases of the eye. Dr. M. Easterbrook is studying uveitis and external diseases of the eye at the Proctor Laboratory, San Francisco.

Dr. Saul Merin has been a Fellow at the Hospital for Sick Children, studying pediatric ophthalmology. He returns to the University of Jerusalem, Israel, at the end of the academic year, having made a significant contribution to our teaching programme.

Dr. G.E.M. Kirker has been a Fellow studying retinal detachment under Dr. M. Shea at St. Michael's Hospital. He will return to the University of Calgary to continue his work in that field.

Dr. Akinosho has completed his academic period with us and returned to Lagos, Nigeria, to join the Department of Ophthalmology there.

Congratulations go to Drs. J.R. Buncic, Gordon J. Johnson, Stanley S. Smith, Theodore Prawak, and Roger D. West, who gained certification from the Royal College of Physicians and Surgeons of Canada, and to Drs. W.S. Dixon, W.M. Easterbrook, G.E.M. Kirker, R.M. Zahoruk, W.G. Pearce, who achieved Fellowship standing.

The major meetings held by the Department during the year were: Walter Wright Day, January 29; Ophthalmology for Family Physicians, February 25 and 26; Annual Refresher Course: Tumours and Plastic Repairs, April 1, 2, and 3; the Annual Research Day, May 13; the Annual Clinical Day, May 14.

The 13th Walter Wright Lecture was given by Dr. Harold F. Falls, of Ann Arbor, Michigan, who spoke on the "The Eyelid as an Aid to Diagnosis of Systemic Disease." This Lectureship is sponsored jointly by the Department and the Toronto Academy of Medicine, Section of Ophthalmology. A full day's programme of papers preceded the lectureship. These were clinically oriented. Grand Ward Rounds were held on the morning following the lecture, with Dr. Falls as guest of honour. This whole programme was well attended, particularly by our Alumni.

The Annual Refresher Course was held on April 1, 2, and 3, 1971. This year the subject examined was "The Management of Tumours of the Lids, Conjunctiva and Orbit" (Cancerous and Cantankerous). We are grateful to Dr. E.A. McCulloch and Dr. D. Osoba of the Princess Margaret Hospital. They gave papers on the first morning of the programme on "Cellular Mechanisms in Cancer," and "Tumour Immunology." Dr. Fred Blodi of the University of Iowa, Dr. Peter H. Ballen of the State University of New York, and Dr. William H. Spencer of the University of California, San Francisco, were guests of honour. Besides members of the Department who contributed, we are appreciative of papers from Dr. G. Wortzman, Toronto General Hospital, Department of Surgery and Department of Radiology, and Dr. J.L. McIntyre, Department of Surgery.

There were a number of registrants in the course. It was put on under the guidance of Dr. W.S. Hunter, at St. Michael's Hospital, with able support from Sister Mary and Dr. R.G.C. Kelly. Grand Ward Rounds the morning following the Course were well attended, Dr. Blodi and Dr. Spencer being guests of honour.

The Annual Departmental Research Meeting was held on May 13, 1971. The subject chosen for special examination was physiologic optics. Dr. M. Alpern, of Ann Arbor, Michigan, was guest of honour, and spoke on "The physiology of rod adaptation," and "The pathophysiology of night blindness." Also contributing to the programme were Dr. M. Hollenberg of the University of Western Ontario, Dr. P.E. Hallett, Department of Physiology, and Dr. D.R. Crapper, Department of Physiology. The John Gaby Prize for the best paper by a fellow was awarded to Dr. R.F. Stevenson for his paper on "Applanation tonography: a clinical trial."

The Annual Clinical Day was held on May 14, 1971. The guest of honour was Dr. Arnold Forrest of the Institute of Ophthalmology, Presbyterian Hospital, Columbia Medical Center, New York. He spoke on "Pathological criteria for success in cyclectomy." The senior residents presented clinical papers and the Alumni prize was won by Dr. W.G. Macrae for his paper on "Intra-ocular foreign bodies: a survey of their long-term medical and social disability." The final session of the day was devoted to case presentations of fluorescein angiography, the material being presented from each of the teaching hospitals.

The Ophthalmic Pathology Laboratory, under the direction of Dr. W.S. Hunter, has processed 377 specimens during the past year. Dr. Vivien Boniuk, as his assistant, has been doing special studies, particularly on the cornea. Miss E. Forster has provided technical help. Dr. Hunter and Dr. Boniuk attended the Canadian Ophthalmological Pathology Society Club meeting at Vancouver in February and presented papers.

The Department wishes to thank the many contributors who have supported our work during the year, both for remuneration of our staff and for the purchase of equipment.

The Selkirk Fund has continued to support the Department, and the Alumni have continued to give valuable aid to the residents.

The l'Anson Fund has assisted our staff and Fellows. I would like to thank Mrs. Lillian Kerbel, who contributed financial aid for valuable instruments. The Independent Order of Odd Fellows has supported Dr. Y. Matuk and has also aided in the purchase of instruments for biochemical research.

The Rebekah Assembly of the I.O.O.F. has continued to assist in this work.

We have also received support from the L.M. Black Estate and for this we are most grateful.

I would like to indicate special appreciation to Mr. R.S. McLaughlin, who has given the Department a laser for the study of photocoagulation of retinal vessels. There have been a number of smaller contributions to the Department, which together have been most significant, and for which we are most grateful.

Mrs. H. Stapells and her family have set up the Ophthalmic Research Foundation and have supported three Fellows during the year.

RESEARCH

Under a Medical Research Council grant entitled "Corneal Research," Dr. P.K. Basu, with the assistance of Mr. F. Carre, Mr. D. Ordean, and Mrs. M. Skorupsky, continued studies on the immunological problems related to corneal grafting, using different kinds of *in vivo* and *in vitro* models. Dr. J.J. Hurwitz and Dr. P.K. Basu have conducted a study on the role of platelets in corneal graft reaction. They have also evaluated a new immunosuppressive agent (Procarbazine) with respect to corneal graft rejection. Dr. G.J. Johnson and Dr. Basu, with the assistance of the tissue typing laboratory at the Toronto Western Hospital, have initiated a system of tissue typing for donors and recipients of keratoplasty. They are also trying to establish suitable models for penetrating keratoplasty in laboratory animals. Dr. G.A. Thompson and Dr. Basu are developing methods for the early diagnosis of corneal graft re-

jection in humans. Dr. Basu, with the assistance of Mrs. A. Wolf, Mr. D. Ordean, Mr. S. Hasany, and Mr. B. Love, is developing methods for better preservation and sterilization of human donor eyes. Dr. E.A. Akinosho, a Fellow from Nigeria, and Dr. Basu have studied the effect of Thio-tepa and colchicine in suppressing corneal graft response. They have also studied ocular mucoid depletion in animals with hypervitaminosis A.

Mrs. A. Wolf is continuing her work as executive secretary of the Eye Bank of Canada (Ontario Division). Since the beginning of the Eye Bank programme in 1955, 5121 eyes have been donated and 2680 eyes have been used for corneal transplantation. The total number of people who have signed donor cards pledging their eyes is now over 50,000. The Eye Bank is a joint programme with the Canadian National Institute for the Blind and is under the direction of Dr. G.A. Thompson. The Eye Bank laboratory, which is financed by the Ontario Hospital Services Commission, is under the supervision of Dr. P.K. Basu, who is assisted in the technical work by Mrs. Wolf, Mr. Ordean, and Mr. Love. Besides supplying cornea, sclera, and vitreous, the Eye Bank also prepares suture materials from cadaveric fascia lata. So far, more than 500 sutures have been supplied to ophthalmic plastic surgeons in Canada and the U.S.A. Setons for glaucoma surgery are also being prepared by the Eye Bank.

With the assistance of a Medical Research Council grant, namely "Keratoprosthesis," Dr. B. Zucker, with the assistance of Mr. F. Sanger, Mr. B. Love, Mr. S. Niewojt, and Mrs. N. Bissoon, has continued to develop the artificial cornea.

With the assistance of a Medical Research Council grant, entitled "Oculomycosis," Dr. J.J. Kazdan and Dr. P.K. Basu, with the assistance of Mr. S. Hasany, have been studying the role of opportunistic fungi in the production of corneal ulcers. They are also engaged in screening human donor eyes for mycological contamination, in order to develop suitable methods for sterilizing Eye Bank eyes.

Dr. J.A. Parker, with the assistance of a Medical Research Council grant entitled "Analysis of the aspheric surfaces of the human lens," has been studying the optical properties of the lens.

Assisted by a Medical Research Council grant, namely "The significance of the various wave forms in the electroretinogram," Dr. C. McCulloch, with the assistance of Drs. J.A. Parker, J.A. Orpin, and J.W. Waisberg, has been continuing work in the field of human electroretinography.

Dr. J.S. Speakman, with the assistance of Dr. M. Ghosh and Miss B. Stachowska, has been conducting investigations on the human lens under a Medical Research Council grant entitled, "A clinical and electron microscopic study of lens exfoliation."

Assisted by a Medical Research Council grant, namely "Filtration of aqueous humour with seton implantation," Dr. R.K. MacDonald, with the assistance of Miss L. Schweigel, has been developing setons for human glaucoma therapy. With Dr. R.F. Stevenson, he has also worked on the problems of applanation tonography.

In addition to the foregoing research works under formal grants, a number of projects have been undertaken by the Staff members, using the facilities of the departmental laboratories. Dr. Y. Matuk, with the assistance of Mrs. M. Behar-Bannelier, has been continuing work on the biosynthesis of proteins by the retina. Drs. R.D. Merritt and Matuk have completed a study on the effect of vitamin A deficiency on the incorporation of glucosamine in the rat retina. Dr. J.D. Morin and Dr. K. Axmith have conducted a study on the avian macrophthalmos without ocular hypertension. A study has been done on enzymatic zonulolysis in rabbits using CA-7 by Drs. L.D.J. Chisholm and I. Melnyk.

A number of research projects related to their particular field of interest have also been undertaken in different hospitals by the clinical staff of the Department. Dr. C.B. Mortimer, with the assistance of Dr. P. Migasena, has been surveying patients with diabetic retinopathy with respect to its natural history and response to photocoagulation. They have been using fluorescein angiographic techniques extensively in their research. Dr. J.C. Hill, with the assistance of Dr. J.C. Walters, has been studying changes with age of lower lid apposition pressures. Dr. B. Slatt has

been investigating seventh nerve palsy using electromyography. In this work he has been assisted by Dr. F. Simon. Dr. G. Johnson has completed a survey of a large pedigree with ocular albinism in Newfoundland. Dr. J.D. Morin has been conducting a statistical survey on congenital glaucoma cases; with the assistance of Dr. A.L. Maberley, he has also done ophthalmodynamometry in infants under anaesthesia. Dr. L. Lloyd has been reviewing optic nerve gliomas at the Hospital for Sick Children. She has also been conducting clinical investigations on neuro-ophthalmological cases at the Toronto General Hospital. Dr. D.R. Smith has been working on the extra-ocular muscle problems. With Dr. S. Merin, he has also studied the effect of penicillamine on ocular chalcosis. Dr. M. Shusterman has been using fluorescein angiography and ruby laser photocoagulation in the treatment of retinal lesions. He has also been interested in intravitreal surgery and intraocular visual lenses. In addition, he has been conducting investigations on the allergic reaction to catgut sutures. Dr. J. Speakman has been making a clinical assessment of patients with pupil block glaucoma. Dr. M. Shea, with the assistance of Dr. T.P. Fejer, has undertaken treatment of diabetic retinopathy by electrocoagulation of vitreal neovascularization. Dr. J. Crawford, with the assistance of Dr. S. Merin, carried out axial tomography in a number of children with eye defects to determine the correlation. He has also conducted clinical research to determine the best form of treatment for children with lamellar cataracts. Drs. W.G. Pearce and D.M. Anderson have analysed ocular findings in rheumatoid arthritis cases. Drs. G.A. Thompson, D.M. Jamieson, and P. Fitzpatrick have made a study on 540 cases of eyelid tumours. Drs. H.M. Macrae and W.G. Macrae have conducted a survey on cases of intraocular foreign bodies with relation to their long-term medical and social disability. Drs. V. Boniuk and M. Ghosh have conduced a histopathological and electron-microscopic study on the conjunctiva in generalized gangliosidosis.

HONOURS

Dr. C. McCulloch is President of the Canadian Ophthalmological Society and is Editor of the *Transactions of the American Ophthalmological Society.*

SCHOLARLY ADDRESSES

Dr. P.K. Basu, "The Factors Involved in Corneal Graft Reaction," Columbia University, New York, October 1970.

Dr. J.S. Crawford, "Complications of Fascia Lata Repair of Ptosis," Ptosis Study Club, Las Vegas, October 1970; "Axial Tomography of Optic Canals in Children," American Ophthalmological Society, May 1971 (With Dr. S. Merin and Dr. W.A. Nash); "Assessment of Incomplete Congenital Cataract," Canadian Ophthalmological Society, Montreal, June 1971.

Dr. W.S. Hunter, "Office Management of the Partially Sighted Patient," Canadian Ophthalmological Society, June 1971; "Reis Bückler's Corneal Dystrophy," Armed Forces Institute of Pathology, May 1971.

Dr. G.J. Johnson, "Tonography in Infants and Children," Canadian Ophthalmological Society, Victoria, June 1970.

Dr. J.C. McCulloch, "Flat Chamber After Cataract Extraction: When, Why and What to do," New York Society For Clinical Ophthalmology, New York, May 1971; "Immunity of the Eye," University of Alberta, Edmonton, March 1971; "Uveitis and Corneal Transplant," University of Alberta, Edmonton, March 1971; "Diabetes Glaucoma," University of Alberta, Edmonton, March 1971; "Frequency Analysis of the Human Electroretinogram," Canadian Ophthalmological Society, Montreal, June 1971 (With Dr. J.W. Waisberg, Dr. J.A. Parker, and Dr. J. Orpin).

Dr. J.D. Morin, "Juvenile Glaucoma," Contemporary Glaucoma Conference, University of California, April 1971.

Dr. C.B. Mortimer, "Diabetic Retinopathy," Canadian Diabetic Workshop, Mount Gabriel, Quebec, October 1970.

Dr. W.G. Pearce, "Single Gene Disorders Affecting the Retina," Queen's Uni-

versity, Kingston, May 1971; "Spontaneous Regeneration of Retinoblastoma," Canadian Ophthalmological Society, Montreal, June 1971.

Dr. M. Shea, "Cryosurgery of Vitreous and Retina," American Academy of Ophthalmology, October 1970; "Indications and Contra-indications for Scleral Explants," Pan-American Ophthalmological Society, Bogota, February 1971; "Cryosurgery of Vitreous and Retina," University of Buffalo, May 1971.

Dr. D.R. Smith, "Comparative Measurement of Exodeviations," American Ophthalmological Society, May 1971.

Dr. J.S. Speakman, "Pupil Block in Aphakia," Canadian Ophthalmological Society, June 1970; "Melanoma of the Choroid," Baltimore Neuropathology Conference, February 1971; "Problems of Glaucoma Management," Montreal Ophthalmological Society, April 1971.

PUBLICATIONS

Akinosho, E.A. and Basu, P.K. "The Control of Corneal Graft Reaction by Topical Application of Antimitotic Agents (Thio-tepa and Colchicine)" (*Canadian Journal of Ophthalmology*, vol. 6, 1971, p. 109).

——— "Ocular Mucoid Depletion in Hypervitaminosis A" (*ibid.*, p. 143).

Basu, P.K. *In vitro Techniques in Ophthalmological Research.* Souvenir issue, 18th Madras State Ophthalmic Conference, convened by the Ophthalmologists of South Arcot and held at "Jipmer", Dhanvantari Nagar, Pondicherry, Oct. 31–Nov. 1, 1970.

Basu, P.K. and Carre, F. "A Method for Studying the Antibody-producing Cells from the Corneal and Conjunctival Tissue" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, p. 293).

Basu, P.K., Lusis, G. and Dhurandhar, R. "The Effect of Air Pollutants on the Eye. II, A Study on their Effect on the Oculo-cardiac Reflex" (*Canadian Journal of Ophthalmology*, vol. 6, 1971, p. 136).

Chisholm, L. "Retinal Detachment in Children" (*Canadian Journal of Ophthalmology*, vol. 6, 1971, pp. 62–7).

Crawford, J.S. "Congenital Fibrosis Syndrome" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, p. 331).

——— "Ptosis: Is it correctable and how?" (*Annals of Ophthalmology*, vol. 3, 1971, p. 5).

De Freitas, F. and Morin, J.D. "The Changes in the Blood Supply of the Posterior Pole of Rabbits with Ocular Hypertension" (*Canadian Journal of Ophthalmology*, vol. 6, 1971, pp. 139–42).

Dixon, W. and Speakman, J.S. "Epithelial Downgrowth following Cataract Surgery" (*Archives of Ophthalmology*, vol. 84, 1970, pp. 303–5).

Fejer, T.P. and Shea, M. "Transvitreal Electrocoagulation of Rabbit Fundal Vessels" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, p. 274).

Fowler, J.H. and Basu, P.K. "Cytology of the Anterior Chamber Fluid in Eyes with Corneal Xenografts" (*Canadian Journal of Ophthalmology*, vol. 6, 1971, p. 68).

Hasany, S.M. and Basu, P.K. "Mycology of Eye Bank Eyes. I, Studies on Frozen-stored Donor Material" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, p. 255).

Johnson, G.J., Corey, P.N. and Morin, J.D. "Tonography in Infants and Children" (*Canadian Journal of Ophthalmology*, vol. 6, 1971, p. 24).

Mandelcorn, M.S. and Crawford, J.S. "Subcutaneous Implantation of Human Fascial Sutures in Rabbits" (*Canadian Journal of Ophthalmology*, vol. 6, 1971, pp. 133–5).

Morgan, A.L., Crawford, J.S. *et al.* "The Eyes and Lids"; in *Paediatric Surgery*, pp. 133–5. Chicago: Year Book Medical Publishers, 1970.

Shea, M. "Cryofixation: Control of Ocular Shape and Movement by Cryoadhesion" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, p. 207).

Waheed, M.A. and Basu, P.K. "The Effect of Air Pollutants on the Eye. II, The Effect of an Organic Extraction on the Conjunctival Goblet Cells" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, p. 226).

OTOLARYNGOLOGY

Under the direction of Professor D.P. Bryce

The Department of Otolaryngology has continued in its programme of postgraduate and undergraduate education without much change during the past year. Two

courses were given in co-operation with the Division of Postgraduate Medical Education; the first in September on Acoustic Impedance Audiometry; and a second in February on Rhinoplasty. Both these courses were well attended and well received by the profession. Similar courses are planned for the coming year.

A particular impetus was given to the Temporal Bone Bank Activities during the year by a grant from the Atkinson Foundation to support the preparation of material received from the Bank. There was particular activity this year in the field of clinical and basic research into carcinoma of the larynx and hypopharynx. This activity has been reflected in the delivery of many related papers to a variety of specialty societies.

The Faculty in Otolaryngology has remained unchanged except for the addition to the staff of St. Michael's Hospital of Dr. R.S. Fenton, a graduate of this training programme.

Dr. Paul Fugere, Professor of Otolaryngology at Laval University was a visting M.R.C. Professor during the month of November. Dr. Fugere visited the various activities in the Department and lectured to the undergraduate and postgraduate students. Dr. Robert Rubin, Professor of Otolaryngology at Albert Einstein University in New York also visited the Department and addressed the students during the month of February. Dr. Garth Hemenway, Professor at Denver, visited in May and took part in the postgraduate training programme in Otolaryngology. Professor Donald Harrison of the University of London and Mr. Ronald Macbeth of Oxford visited us late in May for several days. These visitors took part in seminars and reviewed the research activities of the Department.

RESEARCH

The expansion of research activity involving all aspects of Otolaryngology has continued, and at the end of the academic year 48 projects were underway. This progress has been made possible by the increase in research personnel which includes world-wide representation (England, Scotland, United States, Sweden, West Germany, Pakistan, India, and various parts of Canada). Additional facilities have been provided so that our research laboratories involve the Medical Sciences Building, Banting Institute, 121 St. Joseph's Street, and the associated hospitals (Toronto General, Sunnybrook, St. Michael's, Wellesley, Sick Children's, Mount Sinai, Toronto Western, Princess Margaret, and the Queen Elizabeth). In addition, the facilities of the Defence Research Board at Downsview (Institute of Civil and Defence Environmental Medicine) have enabled valuable assistance.

Various granting agencies included the Atkinson Charitable Foundation of Toronto, Defence Research Board, Charlie Conacher Research Fund, Carey E. Fox Foundation, Ontario Department of Health, Ontario Cancer Treatment and Research Foundation, John F. Hartford Foundation, Medical Research Council, and the Otolaryngological research funds of the associated hospitals.

A development of considerable significance concerns the decision of the Barany Society to hold its next meeting here. This eminent organization was founded in Sweden with the objective of enabling international exchange of research information dealing with the organ of balance and this will be the first meeting of the Society away from Europe.

HONOURS

Dr. D.P. Bryce, elected President of American Triological Society; elected Member of Collegium Oto-Rhino-Laryngologicum Amicitiae Sacrum.

SCHOLARLY ADDRESSES

Dr. P.W.R.M. Alberti, "Audiovisual aids in Otolaryngology," Las Vegas, American Academy of Ophthalmology and Otolaryngology; "Clinical Impedance Audiology,"

Boston, New England Otolaryngological Society; "Bell's Palsy," Cincinnati, to Department of Otolaryngology, Cincinnati University; "Unilateral Exophthalmus," Department of Otolaryngology, University of Cincinnati; "Unilateral Proptosis," Section of Ophthalmology, Academy of Medicine, Toronto; "The Clinical Value of Impedance Audiometry," Halifax, Canadian Otolaryngological Society.

H.O. Barber, "Mystagmographic Aspects," Colby College, Waterville, Maine, Postgraduate Course on Nystagmography; "How Nystagmography is carried out: Standards, Instrumentation, Measurements & Parameters; Demonstration of Technique," Colby College, Waterville, Maine, Postgrad. Course on Nystagmography; "The Audiogram, The Nystagmogram, The Patient," Colby College, Waterville, Maine, Course on Nystagmography, August 1970; "Postural Vertigo and Positional Nystagmus," American Academy of Ophthalmology and Otolaryngology, Las Vegas, Nevada, October 1970; "Vertigo," Postgraduate Course on Neurological Sciences, U. of T., Toronto Western Hospital, November 26 and 27, 1970; "Vertebro-Basilar Ischemia," Department of Otolaryngology, University of Western Ontario, London, Ontario, January 6, 1971; "Diagnostic Labyrinthotomy," Department of Otolaryngology, University of Western Ontario, London, Ontario, January 6, 1971; "Vestibular Findings in Head Injury," Department of Neurology, University of Western Ontario, January 5, 1971; "Vertigo from Head Trauma," Fourth Workshop on Microsurgery of the Temporal Bone, Northwestern University, Chicago, Illinois, March 21–26, 1971; "Clinical Manifestations of Otolith Dysfunction," International Symposium on Otophysiology, University of Michigan Medical Center, Ann Arbor, Michigan, May 22, 1971; "Vestibular Findings in Vertebro-Basilar Ischemia," American Otological Society, San Francisco, California, May 28, 1971; Film "Postural Vertigo and Positional Nystagmus," Triological Meeting, San Francisco, May 25, 1971; "Results of Ultrasound Therapy for Meniere's Disease," Canadian Otolaryngological Society, Montreal, P.Q., June 14, 1971.

Brian D. Birt, "The Restoration of Swallowing after Pharyngectomy," Academy of Medicine, Toronto, October 1970.

T.D.R. Briant, "Transphenoidal Hypophysectomy," American College of Surgeons, New Orleans, Middle Section meeting, April 1970; "Hyperbaric Perfusion of the Larynx," American Laryngological Association, San Francisco, May 23, 1971; "Carcinoma of the Nasal Premaxillary Complex," Canadian Otolaryngological Society, Montreal, May 1971.

D.P. Bryce, "Lesions of Nasal Sinuses Affecting the Eye," Society of Ophthalmology and Otolaryngology, Banff, Alberta, February 1971; "Reconstruction of the Pharynx and Larynx," Society of Ophthalmology and Otolaryngology, Banff, Alberta, February 1971; "Preoperative Irradiation for Laryngeal Carcinoma," American Triological Society, San Francisco, California; "Temporal Bone Bank – of Ontario," Alberta Society of Ophthalmology and Otolaryngology, Banff, Alberta.

V.S. Dayal, "Combined Effect of Noise and Kanamycin," American Otological Society, San Francisco, May 28, 1971; "Low Frequency Bone Conduction Response in Deaf Children," Indian Speech and Hearing Society, Indore, India, January 1971.

G.F. Dohlman, "Histochemistry and Function of Non-Sensory Epithelia in the Inner Ear," Seventh Workshop on Inner Ear: Biology, Stockholm, Sweden, June 15, 1971; "Histochemistry of the Non-Sensory Cells of the Vestibular Labyrinth," University ENT Clinic, Stuttgart, Germany, August 17, 1970.

J. Farkashidy, "Facial Nerve Tumours Within the Temporal Bone," Canadian Otolaryngological Society, Montreal, P.Q., June 1971.

W.H. Johnson, "Experimental Studies of Otolith Function," University of Michigan, Ann Arbor, International Symposium on Otophysiology, May 22, 1971; "Blood Flow Changes during Motion Sickness," Seminar before Clinical Sciences Division, U. of T., March 1971; "Medical Problems in Space Travel," U. of T., Annual Refresher Course, Department of Ophthalmology, April 1, 1971.

R.E. MacDonald, "Innominate Artery Syndrome in Children," American Broncho-esophagological Society Meeting, May 1971, San Francisco; "Common

Problems in Ear, Nose and Throat," North York County Medical Society, March 1971.

Edward D. Manace, "Acinic Cell Carcinoma of the Paranasal Sinuses," Paradise Island, Nassau, Triological Society, Eastern Section, January 1971.

J.S. McGrail, "One Stage Vocal Rehabilitation at Laryngectomy," New York, First International Symposium of Facial Plastic and Reconstructive Surgery, August 1970; "Laryngectomy and Radical Neck Dissection," Salt Lake City, Utah Otolaryngological Society, February 1971; "One Stage Operation for Vocal Rehabilitation Following Laryngectomy," Las Vegas, American Academy of Ophthalmology and Otolaryngology, October 1970.

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Alberti, P.W. "New Tools for Old Tricks" (*Annals of Otology, Rhinology and Laryngology,* vol. 79, 1970, pp. 800–7).

Barber, H.O. *Diagnostic Labyrinthotomy.* Film for residents, graduate otolaryngologists, neurologists and neurosurgeons. 1970.

——— *Postural Vertigo and Positional Nystagmus.* Film, 16½ min., 16 mm. optical sound, colour. Produced by Michael Jacot Productions, Oct. 1970.

Birt, B.D. "The Management of Malignant Tracheal Neoplasms" (*Journal of Laryngology and Otology*, vol. 84, 1970, pp. 723–31).

Dayal, V.S. "Patterns of Pure Tone Hearing Loss. A Comparative Study of Presbycusis, Multiple Sclerosis, Menière's and Acoustic Neuroma" (*Acta Otolaryngologica,* vol. 69, 1970, pp. 329–32).

——— "Functional and Radical Neck Dissection. An Experimental Study" (*Archives of Otolaryngology*, vol. 93, 1971, pp. 413–15).

——— "Comparative Study of Functional and Radical Neck Dissections" (*Proceedings of the 9th International Congress*, 1970, pp. 809–12).

——— "D.C. Potentials in the Semi-Circular Canal of the Pigeon" (*Acta Otolaryngologica*, vol. 69, 1970, pp. 254–6).

Dohlman, G.F. "The Attachment of the Cupulae Otolith and Tectorial Membranes to the Sensory Cell Areas" (*Acta Otolaryngologica*, vol. 71, 1971, pp. 89–105).

McGrail, J.S. "One Stage Vocal Rehabilitation at Laryngectomy" (*Transactions of the American Academy of Ophthalmology and Otolaryngology*, vol. 75, 1971, pp. 510–12).

PAEDIATRICS

Under the direction of Professor H.W. Bain

Division of Ambulatory Paediatrics (Dr. D.A. Stewart)

For the second year in a row since the advent of total prepaid medical care, there was an increase in the number of patients seen in the General Medical Outpatients Department and Specialty Outpatient clinics. Seventy-four thousand, five hundred were seen in 1969 and 80,300 in 1970. The Drop-in Clinic which functions from 4 to 11 p.m. on weekdays and 9 a.m. to 11 p.m. on weekends showed an increase in patients from 13,500 in 1969 to 17,000 in 1970.

Thus, more and more people are using the Hospitals as their "doctor." Whether this is by choice or caused by the unavailability of doctors in their community is not yet clear. We feel that this trend towards delivery of more health services on an ambulatory basis will continue and we have a committee of doctors studying our entire Outpatients operation with a view to making it as much like the service rendered in a private doctor's office as possible.

During the 1970s our objective is to introduce an appointment system in as many areas as possible so that the patient will have his own doctor, relate to his own nurse, spend less time waiting, and in short, be treated as a "private patient."

A Colitis Clinic specializing in gastrointestinal problems of childhood quadrupled its intake in 1970.

Division of Community Health (Dr. Ursula M. Anderson)
After establishing areas of medical need in downtown Toronto, the Division of Community Health began two community clinics providing first contact medical care to children and adults alike. One clinic is in the University Settlement, a short distance from the Hospital, and the other is in the Niagara (Trinity-Bellwoods) area.

In addition to providing health care, an important function of the clinics will be to determine why people do not avail themselves of the medical services so close at hand in the large teaching hospitals.

Dr. Ross Matthews, former President of the Canadian Medical Association and the Ontario Medical Association, joined our full-time staff to assist Dr. Anderson in this project.

Division of Adolescent Medicine (Dr. Martin G. Wolfish)
The adolescent Services Teen Clinic is now in its fourth year of operation and each year sees steady growth. In 1970 there was a 20 per cent increase in the number of patients seen and approximately 30 patients are now seen in clinic each week. Eight staff paediatricians interested in the problems of adolescence now staff the clinic on a rotation basis as do 12 paediatric residents on an elective basis. The Clinic's multidisciplinary approach continues and most patients are seen by a physician, psychiatrist, nurse, and social worker, and all patients are discussed at a weekly conference.

The Teen Clinic serves as a referral facility for several outside agencies including the Juvenile and Family Court, the Catholic Children's Aid Society, the Hinck's Institute, and the Family Planning Centre. It has also served as a treatment centre for several innovative "Street" services, including stopover and other Y.M.C.A. facilities. The Clinic caters to a variety of problems, including drug abuse in children, school adjustment problems, emotional disorders, adolescent gynaecological problems, obesity – to mention only a few.

Division of Neonatology (Dr. Paul Swyer)
Again in 1970 the Newborn Unit with its 50 beds functioned at 120 per cent capacity, often with 80 patients. Dr. Graham Chance from Birmingham, England, joined the full-time staff of the Division with a primary responsibility for developing research into metabolic problems in the newborn. This centre, under Dr. Swyer's direction, has made significant advances in the management of breathing problems of newborn infants. Other research projects include intravenous feeding in infants of very low birth weight and a long-term follow-up of survivors of newborn intensive care. Dr. Chance is developing methods for the study of many aspects of the baby's metabolism, using extremely minute quantities of blood.

It is perhaps worth noting that the latest figures for neonatal mortality for Metropolitan Toronto (the 1969 report) showed that at 12.1 deaths per 1000 live births, the neonatal mortality was the lowest ever recorded, falling from 14.7 in the previous year and from 20 since the intensive care unit in the Neonatal Division came into being in 1962. Since the Neonatal Division at HSC serves as the major referral centre for serious neonatal disease in all of Metropolitan Toronto, there may be some relationship to this decrease.

The Hospital is again planning to reach out into the community. Dr. Swyer has written extensively on the optimal organization for the delivery of neonatal care, and committees set up by the provincial government are working to this end. The Hospital in collaboration with the Ontario Hospital Services Commission will provide an Intensive Care Ambulance Service staffed by residents and/or specially trained nurses beginning in early 1971. The team will go to peripheral hospitals in Metro Toronto, resuscitate newborns and transport them to HSC in special transport incubators.

Division of Gastroenterology (Dr. Richard Hamilton)
Under Dr. Patrick Wei's direction a new intravenous feeding regime has been de-

veloped which permits total nutrition by the intravenous route, using peripheral veins instead of large internal veins. This technique proved to be life-saving for a number of critically ill children who were unable to utilize any food taken in by mouth.

Special studies, including biopsy of the duodenum in children with long-standing treated celiac disease provided the first firm factual basis for advocating prolonged dietary therapy in such cases. With assistance from the Women's Auxiliary, the gluten-free recipe book was translated into Italian and a French edition will be forthcoming in 1971.

Dr. John Glasgow and Dr. Andrew Sass-Kortsak have described new features of a recently recognized metabolic abnormality, alpha-1-antitrypsin deficiency in a group of children suffering from lung and/or liver disease.

Division of Infection (Dr. Crawford Anglin)

One of the most outstanding achievements in the past five years has been a decrease in mortality from meningitis due to H influenza, meningococcus, and pneumococcus from 10–15 per cent to 2.9 per cent. This has been accomplished by a team effort, the team consisting of doctors, nurses, bacteriologists, neurologists, and others. The Infectious Service has now begun research on meningitis in tiny babies during the first month of life. The mortality in this group is still distressingly high (greater than 50 per cent) and one of the objectives for the 1970s is to rectify this situation.

The booklet "Immunization and Related Procedures in Infants and Children" proved immensely popular and the revision with updating and inclusions of new material was completed in 1970. Over 6000 copies of this new brochure have been distributed to physicians and clinics in Canada.

A programme has been developed in co-operation with the Canadian Red Cross Society and the Connaught Medical Research Laboratories for producing a serum (Zoster Immune Globulin) for the protection of seriously ill children (e.g. leukaemics) inadvertently exposed to chicken pox. Chicken pox in such children is frequently fatal.

Division of Cardiology (Dr. John D. Keith)

During the past year, this division has embarked upon a new programme with respect to atherosclerosis (hardening of the arteries) in childhood. A study of coronary arteries in infants and children has shown this disease process to start early in life, and plans are in progress to start screening programmes to identify children who are a high risk and to enrol them in a controlled prophylactic regime.

A programme has been developed in collaboration with McMaster University to assess and document the rheumatic fever picture across the Province of Ontario. A common theme linking these two new developments is an interest in epidemiology which is now providing rich dividends in our studies of heredity and other causative factors in children with congenital heart disease (e.g. blue babies).

Division of Nephrology (Dr. C.P. Rance)

The Nephrology Division was strengthened by the return of Dr. G.S. Arbus and Dr. William Balfe to our full-time staff. Dr. Arbus has taken over supervision of our artificial kidney programme and the medical aspects of kidney transplantation. At present there are nine patients in the Dialysis programme and several transplants have been carried out. Dr. Balfe is studying acid-base problems in children, using new research techniques including ways in which ions cross cell membranes. This work is also important in our understanding of Cystic Fibrosis, Dr. Balfe is conducting research in this area.

Division of Allergy (Dr. C. Collins-Williams)

A large study on the immune status of Canadian children (IgA) commenced in 1969 is nearing completion. A study of environmental factors as precipitating causes

of asthmatic attacks is beginning under a Provincial Health Grant. Asthma is one of the most distressing diseases of children and adults alike. With the completion of our Elm Street Wing, the Allergy Division will have considerably more space for its activities, including badly needed laboratory research space. Over the next five years it is hoped to expand the training programme to four postgraduate students a year, accompanied by a corresponding increase in research activities. This will be greatly enhanced through collaboration with the hospital's new Department of Immunology.

Other Activities of the Department of Paediatrics

The Sioux Lookout Indian Project in Northwestern Ontario picked up momentum in 1970 with a steady stream of doctors, dentists, medical students, and nurses providing general and specialized health care to the Indians of Northwestern Ontario. Dr. Hawke and Dr. Netley of the Department of Psychology did a pilot project on assessing the intelligence of the Indian children with a view to improving educational techniques in the future.

Dr. Hawke has been conducting a survery on the role of nutrition on intelligence and learning ability in Jamaican children for the past four years and the results of the survey will be presented at an International Congress in the near future.

Our Learning Clinic under the direction of Dr. Rebhan has continued to expand so that there is now a back log of patients and a waiting period of almost three month. The greatest emphasis is on communication with the Educators and the results of the clinic findings and recommendations are discussed at length with the parents and a full report is sent to the school. Of the many patients seen, only a very few have true perceptual problems and these are very resistent to most forms of therapy.

VISITORS

Dr. Douglas Gairdner, Consultant Paediatrician, Addenbrook's Hospital, Cambridge, England; Dr. Sonja Balsan, Maitre de Recherche, Centre d'Etudes sur les Maladies due Metabolisme cher L'Engant, Hôpital des enfants Malades, Paris, France; Professor J.M. Tanner, Institute of Child Health, University of London, England; Professor Mary Ellen Avery, Montreal Children's Hospital, Montreal, P.Q.; Professor Robert Good, Gairdner Award Winner, University of Minneapolis, Minneapolis; Dr. Niels E. Brandstrup, Pediatric Department, Central Sygehuset, Denmark; Dr. Sydney Israels, University of British Columbia, Vancouver; Professor Alex Minkowsky, Paris, France; Dr. Bertil Lindquist, Professor of Paediatrics, University of Lund, Lund, Sweden; Dr. W. Ghali, Paediatrician, Zambia; Dr. D. Edworthy, Paediatrician, Kelowna, British Columbia; Dr. Paul B. Beeson, Regius Professor of Medicine, Oxford University; Dr. Dorothy M. Horstmann, Yale University School of Medicine, Department of Public Health and Epidemiology; Dr. Robert J. Haggerty, Department of Paediatrics, University of Rochester School of Medicine, Rochester, N.Y.; Dr. Jean Cortner, Department of Paediatrics, State University of New York at Buffalo, Buffalo, N.Y.; Dr. M. W. Partington, Kingston, Ontario; Dr. Alvin Zipursky, Professor of Paediatrics, McMaster University, Hamilton, Ontario; Dr. Nguyin thii Xiem, Hanoi, North Viet Nam; Miss Khemphet Polsena, (Teacher) Laos; Dr. Paul Malraux, University of Louvain, Belgium; Dr. Leon Rosenberg, Yale University, New Haven, Conn.; Dr. Ghislaine Gilbert, Heart Institute, Montreal; Dr. Richard Rowe, Pediatric Cardiology, Johns Hopkins Hospital, Baltimore, Md.; Dr. David Wade, Royal Infirmary, Edinburgh, Scotland; Mrs. Margaret Semple, Administrator, Children's Hospital, Detroit, Mich.; Dr. Edward W. Green, Pediatric Cardiology, Children's Hospital, Detroit, Mich.; Miss John C. Zulch, Medical Editor, The Macmillan Co., New York, N.Y.; Dr. Michael Rogers, Wentworth, Natal, South Africa; Dr. Rolf Zetterstrom, Department of Paediatrics, Karolinska Institute, Stockholm, Sweden; Dr. William Kitchen, Paediatrician, University of Melbourne, Australia; Dr. G. Enhorning, Dept. of Obstetrics and Gynaecology, Karolinska Insti-

tute, Stockholm, Sweden; Dr. W. Shah, University Teaching Hospital, Lusaka, Zambia.

SCHOLARLY ADDRESSES

C.S. ANGLIN, "Recommendations for Rubella Immunization," International Rubella Conference, Toronto, May 19, 1971.

C. COLLINS-WILLIAMS, "Incidence of Isolated Deficiency of Immunoglobulin IgA in the Serum of Canadian Children," VII International Congress of Allergology, Florence, Italy, October 17, 1970; "Survey of Serum IgA in Canadian Children," American College of Allergists, San Francisco, March 30, 1971; "Provocative Bronchial and Nasal Testing," Association of Hospitals and Homes for Asthmatic Children, San Francisco, March 26, 1971.

F. COCEANI, "Prostaglandins and Neuronal activity in Spinal Cord and Cuneate Nucleus," Conference on Prostaglandins, New York Academy of Science, Sept. 17–19, 1970; "Prostaglandins and Neuronal Activity," Lafayette Clinic, Detroit, Mich.

R.S. FOWLER, "Sudden Death in Aortic Stenosis in Childhood," VI World Congress of Cardiology, London, England, September 6–12, 1970; "Heart Disease in Infants and Children," Paediatric Nursing Conference, Hospital for Sick Children, Toronto, May 13 and 20, 1971; "The Vectorcardiogram Assessment of Severity in Cystic Fibrosis," Canadian Paediatric Society, Kingston, Ontario, June 12–16, 1971.

J.R. HAMILTON, "Childhood Celiac Disease. Response to Challenge with Dietary Gluten," Canadian Association of Gastroenterology, Ottawa, January 1971; "Transmissible Gastroenteritis in Piglets (TGE) : A model for study of acute viral diarrhea," Society for Pediatric Research, Atlantic City, May 1971.

W.A. HAWKE, "Lecture on the Jamaican Project," First Caribbean Mental Retardation Conference, September 1970.

J.D. KEITH, "Natural History of Congenital Heart Disease," VI World Congress of Cardiology, London, England; "Ventricular Septal Defect," New York Academy of Medicine, New York, December 1970; "Ventricular Septal Defect – natural history," "Transposition of the Great Arteries – diagnosis and Therapeutic Management," and discussions, Venezuelan Society of Cardiology, Caracas, Venezuela, February 1971.

B.S.L. KIDD, "The Changing Faces of Congenital Heart Disease," The Royal Victoria Hospital, Belfast, Northern Ireland, September 1970; "Transposition of Great Arteries," The Department of Medicine, University of Edinburgh, Scotland, September 1970; "Pathophysiology in Transposition of Great Vessels," L'Hopital Sainte Justine, Montreal, February, 1971.

V. ROSE, "Endocardial Fibroelastosis with Special Reference to Genetic Counselling," VI World Congress of Cardiology, London, England, September 7, 1970.

A. SASS-KORTSAK, "Is substrate restriction an appropriate treatment for homocystinuria?" Society for Pediatric Research, Atlantic City, May 1971; "Evidence for the physiological role of ceruloplasmin," Can. Society for Clinical Investigation, Ottawa, January 1971; "Alpha$_1$ antitrypsin (AT) deficiency with both cirrhosis and chronic obstructive lung disease in two sibs," Society for Pediatric Research, Atlantic City, May 1971.

F.E. SAUNDERS, "Effect on L-asparaginase on Nucleic Acid Metabolism of Human Leukemia Cells," American Society of Hematology, San Juan, Puerto Rico, 1970; "Effect of L-asparaginase on the Cell Cycle of Leukemia Cells," Canadian Society for Clinical Investigation, Ottawa, Ontario, 1971.

P.R. SWYER, "The Regional Organisation of Special Care for the Neonate," Discussion by Members of the Canadian Paediatric Society and the Society of Obstetricians and Gynaecologists of Canada, Nov. 21–24, 1970; "The Delivery of Perinatal Intensive Care," The Children's Hospital, Denver, Colorado, Feb. 25–26, 1971; "Intravenous Nutrition in Pediatrics," Panel member – Special Session American Pediatric Society and Society for Pediatric Research, Atlantic City, New Jersey, April 28, 1971.

M.W. THOMPSON, "Idiopathic scoliosis: preliminary report of a genetic survey," International Scoliosis Research Society, Toronto, September 1970; "Some Principles of Medical Genetics," International Symposium on Malignant Hyperthermia, Toronto, May 14–15, 1971; "Reticuloendotheliosis: an autosomal recessive disorder resembling runt disease," Fourth Conference on Clinical Delineation of Birth Defects, Johns Hopkins University, June 9–13, 1971.

P. WEI, "Intravenous Feeding of Infants and Children by peripheral vein," Royal College Physicians and Surgeons, Ottawa, January 1971.

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——— "Immunization Procedures for Children in Canada" (*Canadian Family Physician*, vol. 17, 1971, pp. 41–8).

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BOONE, J.E. "Battered Child – The Physician's Role" (*Canadian Family Physician*, vol. 16, 1970, pp. 54–6).

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COCEANI, F. (with Puglisi, L. and Lavers, B.) "Prostaglandins and Neuronal Activity in Spinal Cord and Cuneate Nucleus" (*Annals of the New York Academy of Science*, vol. 180, 1971, pp. 289–301).

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PATHOLOGICAL CHEMISTRY

Under the direction of Professor A.G. Gornall

The year just passed has been marked by steady achievement in this Department, marred only by the lack of resources to convert our old teaching laboratory into useful space. Our staff have established a new record in research publications in spite of crowded laboratories and office facilities that for some are less than adequate. We must continue our efforts to improve this situation in the coming year.

Relationships between our university and hospital colleagues have been improved by establishing a Department Council, with four representatives elected from the Banting Division, four from the Hospital Divisions, one graduate student and one postgraduate student. This Council has defined its terms of reference and has become the senior advisory and policy generating body of the Department. It is encouraging to note the establishment of the University Teaching Hospitals Association. Although the University appears to be under-represented, it is hoped that a new era of understanding and co-operation has been ushered in with this new Association.

Undergraduate Teaching

It has been gratifying to observe a greater involvement of our staff in Period II teaching during the year. For some the load is in danger of becoming excessive, while in a few cases the resources of this Department are not yet fully utilized.

A significant development during the year has been the acceptance of this Department in the Faculty of Arts and Science where we now offer in fourth year course PCH 401, the Biochemistry of Human Disease. Advance registration indicates a considerable interest in this course which is intended for students contemplating a career in clinical biochemistry or in biomedical research.

Graduate Teaching

All graduate courses were taught this year with the exception of those given by Professor W. Paul who was absent on sabbatical. A total of 21 graduate students were registered, 11 for the Ph.D. and 10 for the M.Sc. degree. One student completed the requirements for the Ph.D. and 6 the requirements for the M.Sc. during the year.

Postgraduate Teaching

The Department sponsored a half-day in the Refresher Course for Practising Pathologists held in February. Professor Paul returned from sabbatical to act as moderator of the 15th Annual Postgraduate Course on Radioactive Isotopes.

Two candidates completed the requirements for the Diploma in Clinical Chemistry during the year. In spite of strenuous efforts to establish a reliable source of training stipends for biochemists seeking to qualify as professional clinical chemists, we were greatly disappointed that neither the Ontario Hospital Services Commission

nor the Professional Training Committee of the Department of Health could be persuaded to accept this responsibility. The tragic aspect of this inertia stems from the fact that there has never been such a need or such an opportunity to relieve the shortage of clinical chemists. For the first time in history there is a modest surplus of biochemists. In our teaching hospitals we have 10 training positions for which there have been over 20 well-qualified applicants. Only three places have been filled and these with funds provided on a temporary basis. It is obvious that our efforts to correct this deficiency will have to continue.

There were nine postgraduate students registered in the Department during the year, six in medical residencies in clinical biochemistry.

STAFF

Banting Division

All members of our senior staff have served effectively and with dedication to the work and objectives of the Department and the University. Dr. William Paul, with the assistance of a Commonwealth Medical Fellowship, has spent a sabbatical year at the Institute of Nuclear Medicine, Middlesex Hospital Medical School, London, England. He returns in September and is expected to become involved in new areas of the application of radionuclides to clinical biochemistry.

Dr. N.Z. Stanacev was appointed Graduate Secretary of the Department and has performed the duties of this office with commendable efficiency.

Dr. C.C. Liew joined our staff as Assistant Professor in July 1970. A graduate of this Department, he had spent three highly productive postdoctoral years, two of them as a Canadian Heart Foundation Fellow in England and in New York. During this first year on our staff he has developed an active and enthusiastic research group from which a steady flow of publications is beginning to emerge.

We record with regret the resignation during the year of Dr. J.G. Silah, whose abilities as a teacher and investigator were matched by his loyalty as a colleague. An attractive offer from the United States coupled with our inability to provide proper facilities led to his decision to leave. In the field of steroids and hypertension he will continue to attain distinction.

Visiting Lecturers to the Department during the year, supported by the School of Graduate Studies, have included: Dr. C.T. Caskey, of the National Institutes of Health, Bethesda, Maryland; Dr. C.D. Kochakian, University of Alabama; and Dr. Russell Hilf, School of Medicine and Dentistry, University of Rochester, N.Y.

It is appropriate that I express to Mr. C.H. Downs, Mr. M. Timanoff, Miss A.D. Dix, and the secretarial staff my thanks for their assistance during the year.

The Hospital Divisions

The Departments of Clinical Biochemistry in the teaching hospitals constitute divisions of our Department and the Heads of these divisions hold senior academic rank in the Department.

At the Toronto General Hospital Dr. C.J. Porter reports the resignation of Dr. J.J.B. Armstrong during the year and the appointment of Dr. A. Mazzuchin as a new member of staff.

At Sunnybrook Hospital Dr. A. Malkin reports the addition of Dr. B. Joanne Cadeau to the staff.

At St. Michael's Hospital the many years of competent service of M. O'Sullivan as Head of Clinical Biochemistry will be recognized by promotion to the rank of Assistant Professor in July.

At the Wellesley Hospital Dr. L.A. Wright has made a notable contribution as Director of Clinical Biochemistry and will become Associate Professor in July.

At the New Mt. Sinai Hospital Dr. J.J. Clapp has obtained his certification in clinical chemistry and will become Assistant Professor in July.

At the Clarke Institute of Psychiatry Dr. D.D. Godse, assistant director of Clinical Biochemistry, will become Assistant Professor in July.

RESEARCH

Banting Division

Under the guidance of Professor A.G. Gornall work on the mechanism of hormone action on heart muscle metabolism has continued in collaboration with Dr. C.C. Liew and Dr. D.K. Liu. Mrs. B.J. Cadeau (Ph.D. candidate) has completed her studies of tricarboxylic cycle intermediates in heart muscle. Dr. D.K. Liu, a post-doctoral fellow, has confirmed the previously observed changes induced in kidney enzymes by adrenalectomy and aldosterone administration and shown that citrate synthase and isocitrate, α-ketoglutarate and malate dehydrogenase activities are not altered in heart muscle. Mrs. M. Kandel, Research Associate, in collaboration with Dr. S. Kandel of the Faculty of Pharmacy and assisted by Mrs. L. Beysovec, has continued her studies of the active site of the enzyme carbonic anhydrase. Sulfonamide derivatives with selective inhibitory characteristics have served to identify two histidines in close proximity to the active site, and have shown that neither by itself is essential to the action of the enzyme. Amino acid sequence studies are being carried out to identify the histidines involved.

Professor N.Z. Stanacev, with his graduate students F.J. Carmichael (Ph.D. candidate) and J.B. Davidson (M.Sc. candidate) and assisted by Mrs. L. Stuhne-Sekalec, has continued studies on the biosynthesis and metabolism of complex lipids of biological membranes. The relationship between endogenous lipids of mitochondria and microsomes and phosphatidylglycerol biosynthesis has been studied, in addition to reaction mechanisms involved in the formation of polyglycerophosphatides. Boisynthesis of cardiolipin in mitochondria and submitochondrial localization of polyglycerophosphatide synthetic activity are in progress.

Professor G. Feuer, with his graduate students D. Acheampong-Mensah (Ph.D. Candidate), S.D. Cooper (Ph.D. candidate), R. Kardish (M.Sc. candidate), and Miss D. Miller (M.Sc. candidate), and assisted by Mrs. H. Belina and Mrs. R. Farkas, has continued his investigations of the effect of foreign compounds on the biochemical organization of the liver cell. Their studies have revealed that (*a*) the difference between hepatotoxins and drugs is probably their ability to influence differently microsomal-phospholipid methyl transfer reactions and the phospholipid composition of liver microsomes; (*b*) the reduced drug metabolism during pregnancy and the delayed synthesis of drug metabolizing enzymes in the foetus and newborn is associated with shift in the biotransformation of progesterone from hydroxylation to the reductive pathway; and (*c*) studies with closely related coumarins have shown that enzyme induction capability is associated with the carbonyl and the α-pyran moiety of the molecule and is unrelated to lipid solubility, absorption, or metabolism.

Professor A.D. Baines and his research group have found that extracellular fluid volume expansion produces redistribution of single nephron glomerular filtration rates and of glomerular tubular balance. Extracellular volume expansion increases superficial nephron filtration rate with little effect on maximum glucose reabsorption rate, whereas there is a 50–70 per cent decrease in maximum glucose reabsorption by deep nephrons. Volume expansion appears to affect kidney function primarily through physical and not hormonal changes. Mr. K.E.Y. Tabello (Ph.D.) candidate) has observed no inhibition of distal nephron sodium transport in partially nephrectomized rats, but has found reduced free water formation. The results indicate that urea plays an important role in altering single nephron function when the total nephron population is reduced. Mr. K.G. Koh (M.Sc. candidate) is examining the hydrodynamic aspects of flow through single nephrons using micro-pressure-transducers and micro-infusion pumps.

Professor J.A. Kellen and his group have studied dimethylbenzanthracene (DMBA) induced mammary tumours in rats as a model for breast cancer that permits the study of antigenicity and interferon induction. The antigenicity observed differs from epithelial growth factor. Tumours grown in cell cultures retain their antigenic

specificity for at least two passages, although their cytology allows no distinction from normal fibroblasts. Rats treated with Poly IC show a definite decrease in tumour induction. Over half the DMBA treated animals developed systemic hypertension, which persisted, unrelated to the presence of a tumour, and was accentuated by sodium chloride and was more severe in male rats. Studies of steroid metabolism in these animals are being carried out with the assistance of A. Mirakian. With V. Lustig (Ph.D. candidate) amino acid inhibition patterns of organ and tumour specific alkaline phosphatases have been carried out. In cases of distinctly elevated serum levels the tissue source of the enzyme can be distinguished and the clinical validity of these observations is being investigated. With J. Lo (M.Sc. candidate) the immunological specificity of alkaline phosphatases, their dimers, monomers, and reassembled polymers has been studied. In collaboration with Dr. T.P. Morley of the Department of Surgery a study of the antigenicity of gliomas has been initiated.

Professor K.M. Anderson, with H.C. Crosthwait (M.Sc. candidate) and Mrs. M. Slavik, has studied the effect of hormones on labelling of nuclear proteins in isolated rat liver and prostate nuclei. With R.M. Couch (M.Sc. candidate) he has examined some properties of "chromatin" isolated from rat ventral prostate nuclei. I. Mendelson (Ph.D. candidate) has examined RNA polymerase I and II activities in normal, pregnant, and lactating mammary glands and from carcinogen-induced rat mammary gland tumours. Miss C. de la Torré has studied the effects of insulin on DNA labelling in organ cultures of rat mammary glands and testosterone metabolism in organ cultures of rat ventral prostate. In collaboration with Dr. J.A. Kellen studies have been made of mammary tumour initiation and its inhibition by actinomycin in carcinogen treated rats.

Professor C.C. Liew has led a group whose main interest has been centred on protein metabolism and hormone action at the molecular level. With Dr. D.K. Liu he has studied the effects of aldosterone on mitochondrial enzymes and RNA polymerase activities in isolated nuclei. D. Suria (Ph.D. candidate) has fractionated the acidic proteins in highly purified isolated nuclei from liver and brain. Mrs. K.L. Yao has studied the phosphorylation of ribosomal proteins. Miss A. Lewis has studied histone phosphorylation and acetylation in regenerating liver. In collaboration with Dr. C.C. Yip, Banting and Best Department of Medical Research, studies have been made on the initiation of proinsulin biosynthesis.

Professor J.G. Silah, with the assistance of A. Mirakian, has completed his studies of steroid metabolism in rats as affected by experimental hypertension. It has been shown that hypertension, or its causative factors, in some way affects the enzymes involved in the metabolic transformation of corticosteroids in the liver.

In all these studies the support of the Medical Research Council, The Ontario Cancer Treatment and Research Foundation, the Ontario Heart Foundation, the Addiction Research Foundation, the J.P. Bickell Foundation, and the Anna Fuller Fund is gratefully acknowledged.

Professor H. Cinader and his colleagues in Medical Cell Biology have continued their studies on enzyme activation by specific antibody and have shown that the relative catalysis rate of different substrates can be altered by different fractions of antibody. With Dr. S. Dubiski and Dr. Chi-tao Chou he has continued his studies of the genetic control of the antibody response; with Dr. J.E.M. Rose, he has studied the genetic factors that control tolerance breakdown. Other studies have included the cellular mechanism of tolerance induction, of suppression and induction of stem cell differentiation which can lead to breakdown of tolerance and of suppression. Dr. Cinader has also collaborated with Dr. Jeejeebhoy and others to demonstrate that the action of antilymphocytic serum does not require the participation of late complement components but that antilymphocytic serum contains graft rejecting antibodies whose deleterious action depends on the presence of late-acting complement components. Dr. Cinader has collaborated with Dr. Chin-yu Wu to develop techniques by which the specificity and heterogeneity of plaque-forming cells can be analysed in terms of the antibody response to chemically defined haptens. This technique has

been utilized to demonstrate the potentiation of the immune response by structurally unrelated pre-injected antigens.

Professor S.L. Cohen, in the Department of Obstetrics and Gynaecology, has been co-supervisor of Miss F. Timanoff (M.Sc. candidate) and has continued his studies of conjugated and "labile" estrogens and the fractionation for isolation purposes of large volumes of urine.

Dr. J.E.M. St. Rose, along with Dr. H. Cinader, has been co-supervisor of B.H. Sabiston (Ph.D. candidate) and they have attempted to elucidate the effects of environmental stress on immunological reactivity.

Dr. B.A. Tobe has collaborated in a study of virus-like particles in the serum of patients with serum hepatitis.

The Hospital Divisions

At Toronto General Hospital, under the supervision of Dr. C.J. Porter, Dr. V. Jones (postdoctoral fellow) has developed gas chromatographic techniques for bile acids and some commonly abused drugs. She has also studied the determination of medium chain fatty acids in faeces and the use of indocyanine green to assess hepatic blood flow. Dr. A. Mazzuchin (postdoctoral fellow) has carried out studies of lipoprotein electrophoresis, automated fluorometric methods for cholesterol and triglyceride, and infrared analysis of calculi. He has also tested the reliability of amylase kits and the Ames densitometer for glucose analysis.

At Sunnybrook Hospital, under the direction of Dr. A. Malkin, Dr. D.A.G. Mickle (M.Sc. candidate) has shown that human white blood cell glutaminase activity is lower in females than in males and low in some subjects with idiopathic gout.

At Toronto Western Hospital Dr. S. Dubiski has continued his research in immunobiology and immunogenetics centred around genetically determined structural markers of rabbit immunoglobulin molecules (allotypes) and their role in the regulation of antibody formation. Dr. R.R. Ogilvie has introduced a kinetic analysis of creatine phosphokinase as a diagnostic test for neurological muscular disease. The automated, fluorometric method for triglyceride has been modified to increase its precision. Dr. H. Husdan has studied the effect of posture on the concentration of various plasma constituents, the effect of several factors on plasma calcium measurements and developed an automated system for the rapid determination of creatinine clearances in kidney transplant patients. With Dr. Joan Harrison (Department of Medicine) he has established the usefulness of ^{51}Cr as a stool marker for balance studies. With Dr. A. Rapoport (Department of Medicine) he has studied secondary electrolyte changes during the treatment of hypercalcuria with thiazides and the biochemical profile that might serve to distinguish this disorder from normocalcemic primary hyperparathyroidism. Other collaborative studies include the calcification properties of hypercalcuric urines and balance studies in renal osteodystrophy and parathyroid disorders.

At the Hospital for Sick Children, Dr. S.H. Jackson with J. Heininger (Ph.D. candidate) has continued to study the re-utilization of mature collagen in granuloma formation. Collaborative studies on inherited disorders of amino acid metabolism are continuing.

At St. Michael's Hospital, under M. O'Sullivan, Mrs. Gloria Buckley has continued studies of hyperlipidemias in collaboration with Dr. J.A. Little (Department of Medicine).

At the Wellesley Hospital Dr. L.A. Wright has developed a system of drug analysis suitable for an urban hospital.

At the Women's College Hospital Dr. F.H. Sims has studied with Dr. G. Hiraki (Department of Surgery) the relationship of pancreatic function to the development of experimental atheroma in the rabbit. With Mrs. E. Giesbrecht and Dr. J. Taylor (Department of Obstetrics and Gynaecology) he has compared the methods of Brown and Cohen for urine estriol and their clinical correlation. With S. Gardner

(medical student) he has studied serum lactic dehydrogenase levels after intraperitoneal haemorrhage.

At the Clarke Institute of Psychiatry Dr. D.D. Godse has developed methods for the determination of serotonin, norepinephrine, and their metabolites in blood, urine, and animal tissues.

HONOURS

The Ames Award for 1971 was presented to Dr. C.J. Porter by the Canadian Society of Clinical Chemists.

In 1970 the Stuart Alan Hoffman Memorial Prize was awarded to Mrs. B. Joanne Cadeau, and in 1971 to J.B. Davidson, for excellence in research.

Dr. B. Cinader was elected a Fellow of the Royal Society of Canada in June 1971, and became a member of the World Health Organization Expert Advisory Panel on Immunology during the year.

SCHOLARLY ADDRESSES

American Association of Clinical Chemists, Buffalo, N.Y., Annual Meeting, July 1970: C.J. Porter and (Mr.) E. Kellweit, "An Automated System for Measurement of Calcium, Magnesium and Lithium in Serum and Urine by Atomic Absorption Spectrophotometry."

American Society of Biological Chemists Meeting, San Francisco, June 1971: S. L. Cohen, "Rapid Isolation of Large Amounts of Sodium Estriol Glucosiduronate (NaEG) or Estriol Glucosiduronic Acid (EG)."

American Society for Cell Biology Tenth Annual Meeting, San Diego, Chile, Nov. 1970: C.C. Liew, "Isolation and Biological Activity of Mammalian Helical Polyribosomes" (co-author), read by A. Monneron.

Annual Research Meeting, Dept. of Ophthalmology, University of Toronto, May 1971: S.H. Jackson, "Effect of Homocysteine on Collagen."

British Industrial Biological Research Association, and Medical Research Council Research Units, Carshalton, England, Sept. 1970: G. Feuer, "Developmental Formation of Drug Metabolizing Enzymes in the Liver of the Rat."

Canadian Federation of Biological Societies Fourteenth Annual Meeting, Toronto, June 1971: S.D. Cooper (Mr.), H. Belina (Mrs.), and G. Feuer, "Effect of Foreign Compounds on Liver-microsomal Phospholipids Related to Drug Metabolism"; R.M. Couch (Mr.) and K.M. Anderson, "Some Properties of Chromatin Isolated from Rat Ventral Prostate Nuclei"; J.B. Davidson (Mr.) and N.Z. Stanacev, "Biosynthesis of Cardiolipin in Mitochondria"; G. Feuer, "Quantitative Correlation between Structure and Function of the Hepatic Endoplasmic Reticulum" (co-author), read by F.A. de la Iglesia; M. Kandel, A.G. Gornall, S.C. Wong, and, S.I. Kandel, "Affinity Labelling of the Active Site of Human Carbonic Anhydrase B with N-Bromoacetylacetazolamide"; R. Kardish (Mr.), R. Farkas (Mrs.), and G. Feuer, "Inhibition of Microsomal Hydroxylation in the Liver of the Fetus and Newborn by Maternal Steroids"; J.A. Kellen and Chita de la Torré (Miss), "Antigenicity of dmba-induced Rat Mammary Tumours in Cell Culture"; D.K. Liu, C.C. Liew and A.G. Gornall, "Effects of Aldosterone on Enzyme Activities in Purified Mitochondria and in Isolated Kidney and Heart Nuclei"; J.S. Lo (Mr.) and J.A. Kellen, "Partial Reactivation of Placental Alkaline Phosphatase by Mg^{++} in the Absence of Zn^{++}"; V. Lustig (Mr.) and J.A. Kellen, "Effects of 1-Homoarginine on Tissue Alkaline Phosphatases *in vivo*"; I.S. Mendelson (Mr.) and K.M. Anderson, "Mammary Gland Nuclear rna Polymerase Activities in Pregnant, Lactating and 7,12-dmba-induced Mammary Tumor-bearing Rats"; B.H. Sabiston (Mr.) and J.E.M. St. Rose, "Effect of Cold-Exposure on the Immunologic Response of Rabbits to Human Serum Albumin"; J.E.M. St. Rose and B. Cinader, "Genetic Control of the Immune Response of Rabbits to Chemically Defined Antigens."

Canadian Society of Chemotherapy, Seventh Meeting, Mont Orford, Quebec, May 1971: G. Feuer and (Mr.) S.D. Cooper *et al.*, "Microsomal Phospholipids and Drug Action."

City University, New York, Department of Clinical Pathology, July 1970: G. Feuer, "Some Aspects of the Action of Coumarins on the Hepatic Endoplasmic Reticulum."

Clinical Research Society of Toronto Annual Meeting, May 1971: G. Feuer and (Mr.) R. Kardish, "Is Breast-feeding Beneficial for the Newborn?"

Eighth International Congress of Biochemistry, Montreux, Switzerland, Sept. 1970: G. Feuer, (Mrs.) H. Belina, and (Mr.) S.D. Cooper, "Changes in Microsomal Phospholipids as Early Effects of Foreign Compounds on the Hepatic Endoplasmic Reticulum."

Federation of American Societies for Experimental Biology Sixtieth Annual Meeting, Chicago, April 1971: K.M. Anderson, J.A. Kellen, and A.G. Gornall, "Hypertension and Abnormal Adrenal Mitochondrial Ultrastructure in Rats Treated with a DMBA-lipid Emulsion"; K.E.Y. Tabello (Mr.) and A.D. Baines, "Function of Diluting Segment in Rats with Reduced Numbers of Nephrons."

Fourth Canadian Conference on Research in the Rheumatic Diseases, Toronto, Oct. 1970: B.Cinader, H.F. Jeejeebhoy, S.W. Koh and A.G. Rabbat, "A Murine Complement Defect as a Tool in the Analysis of Immunosuppression by ALS."

NATO Advanced Study Institute on Cellular Differentiation and Regulation of the Immune Response, Minaki Lodge, Ontario, July 1970: B. Cinader, "Allotopy as a Probe" and "Tolerance Regulation."

National Research Laboratories, Ottawa, Canada, April 1971: N.Z. Stanacev lectured on "Biosynthesis of Polyglycerophosphatides in Mitochondria" and conducted a seminar in the NRC Laboratory of Biochemistry on "Enzymatic Spin Labelling of Phospholipids of Biological Membranes."

Symposium on Biomedical Applications of Atomic Absorption, Second Northeast Regional Meeting of American Chemical Society, Oct. 1970: C.J. Porter, "Measurements of Calcium, Magnesium and Lithium in Serum and Urine by Automated Atomic Absorption Spectrophotometry."

Tenth International Congress for Microbiology, Mexico City, Aug. 1970: B. Cinader, "Interaction between Enzymes and Activating Antibody."

Third International Congress on Steroidal Hormones, Hamburg, Germany, Sept. 1970: S.L. Cohen, "Excretion of Estrogens by Pregnant Diabetic Women"; G. Feuer and (Miss) V. Granda, "Steroid Hormones as Possible Regulators of the Development of the Hepatic Microsomal Drug Metabolizing System in the Fetus and Newborn."

University of Bonn, Germany, Dept. of Clinical Science, Sept. 1970: S.L. Cohen, "Some Applications of Ammonium Sulphate Precipitation in Studies on Estrogen Metabolism."

University of Wisconsin, Dept. of Genetics, May 1971: S. Dubiski, "Immunogenetics of Allotypes of Rabbit Immunoglobulins."

University of Windsor, Dept. of Chemistry, Oct. 1970: C.J. Porter was guest lecturer on "The Toronto In-Common Laboratory Project – Experiences in Centralization of Clinical Chemistry Services."

Warner-Lambert Research Institute, Sheridan Park, Ontario, May 1971: G. Feuer, "Application of Biochemical Tests in the Assessment of Toxicity."

PUBLICATIONS

Anderson, K.M. "Probable Effect of Diabetes Mellitus on Incorporation of Amino Acids into Proteins Catalyzed by Isolated Rat Liver Nuclei" (*Experientia*, vol. 27, 1971, pp. 333–5).

Anderson, K.M., Lee, F.H. and Miyai, K. "Effects of Androgen *in vivo* on some properties of Isolated Rat Ventral Prostate Nuclei" (*Experimental Cell Research*, vol. 61, 1970, pp. 371–8).

Anderson, K.M. and Kellen, J.A. "Suppression of Carcinogen-induced Rat Mammary Tumor Formation by Actinomycin D" (*Experientia*, vol. 26, 1970, pp. 1000–1).

——— "Reduced incidence of DMBA-induced Rat Mammary Tumorigenesis due to Actinomycin D and the Development of DMBA-induced Hypertension" (*Oncology*, vol. 26, 1971, pp. 49–58).

Anderson, K.M., Crosthwait, H.C. and Slavik, M. "Incorporation of Amino Acids into Proteins Catalyzed by Isolated Prostate Nuclei" (*Experimental Cell Research*, vol. 66, 1971, pp. 273–82).

Borensztajn, D. and Malkin, A. "Variabilité de la Concentration du Facteur Hypothalamique CRF dans le Système Porte Hypophysaire" (Colloques Nationaux du Centre National de la Recherche Scientifique, no. 927, *Neuroendocrinologie*, 1970, pp. 185–90).

Davidson, J.B. and Stanacev, N.Z. "Biosynthesis of Cardiolipin in Mitochondria" (*Biochemical and Biophysical Research Communications*, vol. 42, March 19, 1971, pp. 1191–9).

Doran, T.A., Bjerre, S. and Porter, C.J. "Creatinine, Uric Acid and Electrolytes in Amniotic Fluid" (*American Journal of Obstetrics and Gynecology*, vol. 106, 1970, pp. 325–32).

Dubiski, S. and Swierczynska, Z. "Allotypic Suppression in Rabbits Operational Characterization of the Target Cells" (*International Archives of Allergy*, vol. 40, 1971, pp. 1–18).

Dubiski (with Mage, R.G. *et al.*) "The Quantitative Expression, Genetics and Chemistry of Allotypes, Types and Subtypes of Rabbit Light Polypeptide Chains"; in *Protides of Biological Fluids*, ed. H. Peeters, pp. 215–23. Oxford: Pergamon Press, 1970.

Feuer, G. "3-Hydroxylation of Coumarin as 4-Methylcoumarin by Rat-liver Microsomes and its Induction by 4-Methylcoumarin given Orally" (*Chem. Biol. Interactions*, vol. 2, 1970, pp. 203–16).

——— Reviews, *Therapeutics*, vol. 1, Feb. 1971, p. 33; March 1971, p. 26; April 1971, p. 17.

Feuer, G. (with de la Iglesia, F.A. *et al.*) "Quantitative Morphology and Function of the Hepatic Endoplasmic Reticulum in Dietary Necrotic Liver Degeneration" (*Am. J. Pathol.*, vol. 62, 1971, p. 81a).

Feuer, G. and Granda, V. "Steroid Hormones as Possible Regulators of the Development of the Hepatic Microsomal Drug Metabolizing System in the Fetus and Newborn" (*Excerpta Medica International Congress Series*, no. 210, 1970, p. 169).

Gibbs, P.A. and Feuer, G. (with Janakidevi, K.) "Metabolism of Coumarin and 4-Methylcoumarin by Rat-liver Microsomes" (*Can. J. Biochem.*, vol. 49, 1971, pp. 177–84).

Jackson, S.H. and Heininger, J.A. "Collagen Reutilization in Normal and Hypersomatotropic Rats" (*Clinica Chimica Acta*, vol. 33, 1971, pp. 179–86).

Jackson, S.H., Hanley, W.H. and Gero, T. "Detection of Phenylketonuric Heterozygotes" (*Clinical Chemistry*, vol. 17, 1971, pp. 538–43).

Kellen, J.A. "Immunological Aspects of Cancer" (*Therapeutics*, vol. 1, 1971, p. 6).

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Kellen, J.A. and Anderson, K.M. "The Antigenicity of Rat Mammary Tumours, Induced by 7,12-Dimethylbenz(α)anthracene" (*Oncology*, vol. 25, 1971, pp. 49–54).

Kellen, J.A. and Lustig, V. "Patterns of Amino Acid Inhibition of Alkaline Phosphatases as an Aid in Cancer Diagnosis" (*Oncology*, vol. 25, 1971, pp. 239–48).

Liew, C.C. (with Haslett, G.W. and Allfrey, V.G.) "N-Acetylseryl-tRNA and Polypeptide Chain Initiation during Histone Biosynthesis" (*Nature*, vol. 226, May 2, 1970, pp. 414–17).

Liew, C.C. (with Korner, A.) "The Effect of Cell Sap Fractions on Incorporation of Amino Acids into Protein in Rat Liver Cell-free Systems" (*Can. J. Biochem.*, vol. 48, 1970, pp. 735–9).

Liew, C.C. (with Monneron, A. and Allfrey, V.G.) "Isolation and Biological Activity of Mammalian Helical Polyribosomes" (*Journal of Molecular Biology*, vol. 57, 1971, pp. 335–50).

Lustig, V. and Kellen, J.A. "The Ultrastructural Localization of Alkaline Phosphatase Isoenzymes in Some Normal and Malignant Cells" (*Enzyme*, vol. 12, 1971, pp. 76–87).

——— "Species, Organ and Subcellular Specificity of Alkaline Phosphatases as Determined by Amino Acid Inhibition Studies" (*Comparative Biochemistry and Physiology*, vol. 39B, 1971, pp. 305–10).

——— "Temperature Optimum of Alkaline Phosphatases in Some Homeothermic and Poikilothermic Species" (*ibid.*, pp. 311–15).

Naylor, D.H. and Cinader, B. "Inheritance, Hormonal Regulation and Properties of Polymorphic Murine Antigens Mud1 and Mud2" (*International Archives of Allergy and Applied Immunology*, vol. 39, 1970, pp. 511–39).

——— "Derivatives of the Complement Component MuBl ($C5^{mu}$) and Separation of a Factor Involved in the Conversion of MuBl to $MuBl_f$" (*ibid.*, pp. 540–65).

Silah, J.G. "Reduction of the Δ^4-3-Ketosteroids by Normal and Hypertensive Rat Liver" (*Endocrinology*, vol. 87, 1970, pp. 90–8).

——— "Ring A Reduction of Cortisol by Hypertensive Rat Liver *in vitro*" (*ibid.*, vol. 88, 1971, pp. 1071–4).

Sims, F.H. "Profile Testing of Adult Admissions to Hospital" (*New Zealand Medical Journal*, vol. 72, 1970, pp. 13–16).

——— "A Study of Laboratory Error in Chemical Pathology" (*Pathology*, vol. 2, 1970, pp. 107–14).

Stanacev, N.Z. and Stuhne-Sekalec, L. "On the Mechanism of Enzymatic Phosphatidylation. Biosynthesis of Cardiolipin Catalyzed by Phospholipase D" (*Biochimica et Biophysica Acta*, vol. 210, 1970, pp. 350–2).

Stuhne-Sekalec, L. and Stanacev, N.Z. "An Examination of the Relation between Endogenous Lipid and the Activity of the Phosphatidylglycerol-forming Enzyme System in Beef Heart Mitochondria and Microsomes" (*Canadian Journal of Biochemistry*, vol. 48, 1970, pp. 1214–21).

Tobe, B.A. (with Zalan, E. *et al.*) "Association of Virus-like Particles with Australian Antigen in Serum of Patients with Serum Hepatitis" (*Canadian Medical Association Journal*, vol. 104, Jan. 23, 1971, pp. 145–7).

Turcotte, G. and Silah, J.G. "Corticosterone Sulfation by Livers of Normal and Hypertensive Rats" (*Endocrinology*, vol. 87, 1970, pp. 723–9).

PATHOLOGY

Under the direction of Professor A.C. Ritchie

For some years now, this report has had to begin by drawing attention to the unsatisfactory facilities available to the Department in the Teaching Hospitals. This year can be no exception. In many of the Hospitals, the physical facilities available are grossly inadequate for a good clinical service, to say nothing of teaching undergraduate, postgraduate, or graduate. Particular mention must be made again of the disgraceful and dangerous state of the autopsy and histological services in the Banting Institute. A remedy is long overdue.

Similarly attention must be drawn again to the lack of support from the University for the Teaching staff. Teaching in the undergraduate course is now largely decentralized, as is postgraduate teaching, and considerable demands are made on the staff of all the Teaching Hospitals, and yet except at the Toronto General and Sunnybrook the University offers only trivial support of a few hundred dollars, and even at the Toronto General and Sunnybrook the level of University support is inadequate to meet the demands the University makes on the staff.

These deficiencies are the more important at this time, for it is now abundantly clear that the Department must develop in the Teaching Hospitals special units, with pathologists specially skilled in the various sub-specialties of medicine, if we are to meet the needs of the University and provide properly for the care of the sick. Such units will entail increases in staff, both professional and non-professional, and will require the provision of appropriate housing. Part of this increase should be the responsibility of the University.

The state of the Division of General and Experimental Pathology housed in the Medical Sciences Building is little better. The Division does have good facilities for its work, and is establishing a good staff, but enjoys little direct support from the University. No member of its professional staff, for example, is paid primarily by the Faculty. This again is anomalous.

The introduction of the new undergraduate curriculum and particularly the beginning of the new Period II, has greatly changed the role of the Department in this aspect of its work. It cannot be pretended that the change has been for the better. The expenditure of time and effort, particularly professional time and professional effort, seems to have increased a good deal, but the quality and efficacy of the teaching of Pathology has decreased enormously.

This is not the place to enlarge on the problems of the undergraduate curriculum, though Dr. Rewcastle's comments later in this report apply to other systems as well as to the nervous system. Perhaps only two points should be stressed. The present Period I, and the course in the scientific aspects of general pathology with which it concludes, do not prepare the students adequately for the study of clinical medicine in Period II. There is too large a gap between the theory and the practical effects of disease in the body. It seems necessary to reinstate a course which will achieve one of the classical tasks of undergraduate courses in Pathology, which is to bridge this gap. The second problem is in Period II. Such Pathology as is taught is presented in

a fragmented and often incomplete or amateurish way. The presentation of pathological processes tends to begin at an elementary level in each system, and is not developed by extension from one system to the next. Indeed, the student who ends with a good understanding of pathology could be said to have gained it in spite of the curriculum.

The course in General Pathology for Dental students has continued under the direction of Dr. N.S. Taichman. The correlation of the work with dental practice continues to be most valuable.

The lecture course for students in Physical and Occupational Therapy was organized by Dr. S. Ritchie, and continued as in the past. The Department also shared in the courses arranged by the Toronto Institute for Pastoral Training.

Dr. Walter gave a course in Pathology for nurses to the second year class of the Toronto General Hospital.

Discussions with the Faculty of Pharmacy have explored the possibility of introducing a course in Pathology for pharmacists, to be given conjointly by the Departments of Pathology and Pathological Chemistry. It is hoped that such a course may be introduced in the academic year 1971–72.

The postgraduate programmes in General Pathology, Anatomical Pathology, Haematological Pathology, and Neuropathology have continued as in the past, with the emphasis predominantly on residency training in the Teaching Hospitals. This will probably be the last year that the programmes continue in this form. Both the needs of the men in training, and the new requirements of the Royal College, require the introduction of a more structured course, and discussions are now continuing both within the Department and with the other departments of laboratory medicine to determine how best this might be done.

The considerable load of teaching given in the Division of Postgraduate Medical Education to men training in other specialties continues, with much of the load falling on Dr. Anderson. In addition to the Monday night course in General and Special Pathology, courses were given in otolaryngological pathology, ophthalmological pathology, obstetrical and gynaecological pathology, and urological pathology. Dr. Pinkerton organized a series of seminars in haematology.

The Refresher Course for Pathologists in Practice was again organized by Dr. H.T.G. Strawbridge, in co-operation with the Departments of Bacteriology and Pathological Chemistry. Once again, the programme was well received.

In the School for Graduate Studies, a course in Advanced General Pathology was organized by Dr. Taichman, and seminars in experimental pathology were continued under the direction of Dr. Movat. Dr. Simon continued his successful course in Ultrastructural Pathology. Six students are now registered for the degree of Master of Science, and seven for the degree of Doctor of Philosophy. Four other research fellows are also training in the Department.

Several new members joined the staff of the Department during the year. Dr. K. Kovacs, who has had a distinguished career in Hungary, England, and more recently in Montreal, joined the staff of St. Michael's Hospital. Dr. Kovacs is particularly interested in endocrinological disease. Dr. N. Cooter joined the staff of the New Mount Sinai Hospital, coming to us from Sarnia after training in England, Dr. G.J. Laroye joined the staff of the Princess Margaret and Wellesley Hospitals after finishing his training in Ottawa, and Dr. P. Feldman will be joining St. Michael's Hospital on completing his training in St. Louis. Dr. D. Bloxam came from the University of Sussex to work in the Medical Sciences Building with Dr. Fisher in experimental studies of liver disease. Dr. R.K. Murray of the Department of Biochemistry also joined us, taking up a cross appointment.

With regret we have received the resignation of Dr. H.T. van Patter, who after many years at St. Michael's Hospital has moved to the North York General Hospital. Dr. S. Mariz has left the New Mount Sinai Hospital to join the staff at St. Joseph's. Dr. K. Miyai has gone from the Banting Institute to La Jolla to join the Department of Pathology there, and Dr. N. Medline has left St. Michael's Hospital to join the staff of the York-Finch Hospital. We wish them all well.

Dr. M.J. Platts of the Princess Margaret and Wellesley Hospitals has spent a year of absence studying neuropathology with Dr. L.J. Rubinstein of Stanford University.

Among the many distinguished visitors to the Department were: Dr. M.J. Kaplan, the Metropolitan General Hospital and Case-Western Reserve University, Cleveland, Ohio; Dr. A.G. Sanders, the Sir William Dunn School of Pathology, Oxford; Dr. W.H. Clark, Jr., Temple University, Philadelphia, Pa.; Dr. L.M. Reid, the Brompton Hospital, London, England; Dr. M.E. Conrad, Walter Reed Army Institute of Research, Washington, D.C.; Dr. H. Popper, Mount Sinai School of Medicine, New York; Professor R. Hudson, the National Heart Hospital, London, England; Dr. F. Sanger, the MRC Laboratory of Molecular Biology, Cambridge, England; Dr. H. Shin, Johns Hopkins School of Medicine, Baltimore, Md.; Dr. H.M. Frost, Henry Ford Hospital, Detroit; Dr. M. Brain, McMaster University, Hamilton; Dr. J. Richardson, the Massachusetts General Hospital, Boston.

DIVISION OF NEUROPATHOLOGY

Undergraduate Teaching

The major teaching involving members of the Division is performed in the Nervous System of Period IIA, compressed into a five-week period. A total of nine didactic lectures are given by Drs. Deck and Rewcastle. Owing to the decentralization of the seminar and clinical portions of the programme, the amount of seminar teaching was variable. In some instances there was a distinct lack of communication between the co-ordinator of the hospital neurology teaching programme and their pathology department. In the central group of hospitals ten hours of seminar teaching were given to groups of students of approximately twenty each. Drs. Rewcastle and Norman were assisted by Assistant Residents in the Neuropathology training programme. Both from lecturing to the present Period IIA and encountering them in the seminar periods, it is apparent that the students' understanding of basic disease mechanisms was extremely meagre and this automatically led to the lowering of the level of teaching. I also believe that the teaching of the nervous system comes too early in Period II. It would seem more logical to place this system after the cardiovascular and respiratory systems, since these have many profound effects upon the nervous system. At the end of the nervous system teaching there was a small examination given, combining a few kodachromes and simple multiple choice questions. Dr. Deck represented the Division in the compilation of the examination, though in actual fact, since the written examination comprised only a small percentage of the total student assessment, the number of pathology questions was very small indeed. Thus it would appear that the role of the pathologist has been considerably downgraded in the role of student assessment during Periods II and III of the medical students' programme.

It should be noted that during the Period IIA nervous system teaching in the central group of hospitals, the routine service work and postgraduate training programme came to a complete standstill. Staff and residents were involved in preparing for, or presenting, at the various teaching sessions.

Postgraduate Teaching

The number of positions available for Neuropathology residency training remained at six during this academic year and we have continued the practice of twice-yearly practical examination for those trainees specializing in Neuropathology. It would seem that this is a worthwhile exercise both for the staff of the Division and the trainees. In addition to the In-hospital programmes at the Toronto General Hospital, Toronto Western Hospital, and Hospital for Sick Children, the members of the Division, staff and trainees, have continued to meet weekly throughout the academic year. These meetings have alternated between the above-named hospitals and have included slide sessions reviewing current interesting material, seminars given by either staff or trainees, and a Journal Club. These meetings have been open to interested clinical trainees and trainees in the Department of Pathology in the University of

Toronto. The Neuromuscular Club met regularly through the academic year, rotating at various interested hospitals. Drs. Armstrong, Bouchard, Humphrey, and Rewcastle were concerned with presentations on two occasions.

DIVISION OF GENERAL AND EXPERIMENTAL PATHOLOGY

Members of the Division were participating for the first time in the General Pathology course of the new curriculum. Dr. Movat acted as Chairman of the General Pathology course designated "General Pathological Processes." Despite the short time available (two weeks), the students seem to have done well by being exposed to the point of "saturation" to General Pathology. Dr. Ranadive participated also in the teaching of immunology and Dr. Taichman was in charge of the General Pathology course for dental students.

RESEARCH

In the Toronto General Hospital and Banting Institute, Dr. Ritchie and Dr. Raick have continued their work on experimental carcinogenesis, with particular reference to the nature of the changes induced in the skin by fraction A_1 of croton oil.

In collaboration with Dr. Pinkerton of Sunnybrook Hospital, Dr. Simon and Dr Bédard have continued their study of the uptake of iron in normal mice, and in mice with iron overload or with a congenital deficiency in iron absorption.

With Dr. Schnuda, Dr. Simon has studied the circulation of lymphocytes through the lymphnode, and with Dr. Nopajaroonsri has studied the normal structure of the lymphnode, and the phagocytosis of intravenously administered carbon within it. With Dr. Luk, he has investigated the ultrastructure of the bone and bone marrow. Studies of the haemolymphnodes of the rat, and of the modifications induced in the kidney by the perfusion of trypsin have also been continued.

Dr. Silver has continued his work on the morphology of normal and diseased heart valves, working with Dr. Kostuk, and has investigated the fine structural changes in the myocardium of patients with diabetes and myxoedema.

Dr. Phillips and Dr. Yu have continued their studies of experimental fructosaemia and, with Dr. Susan Ritchie, Dr. Phillips has studied liver biopsies from patients with fulminating hepatitis, cirrhosis, and liver cell tumours. With Dr. Fisher, he has begun a study of the ultrastructural aspects of bile acid metabolism in the isolated perfused liver. The ultrastructural aspects of certain tumours has also been investigated, and the diagnostic value of electron microscopy established.

Dr. van Nostrand, with Dr. Bryce, has continued his work on the extension of carcinoma of the larynx.

Dr. Thompson is continuing his study of oral contraceptives and cervical atypia.

Mrs. Crookston has continued to study the human blood groups, and has extended our knowledge of the ABO, Lewis, Ii, Chido and HEMPAS groups. A previously unrecognized lipid substance has been recognized in the plasma of normal subjects, and its characterization is continuing. In collaboration with Dr. Good of Minneapolis, the presence of Lewis substances in the plasma of a boy who received a bone marrow graft from his sister has been described. In collaboration with Dr. Crookston and Dr. Shumak, Mrs. Crookston has established the presence of i antigens on the lymphocytes of newborn and adult subjects, and the presence of anti-i which reacts as an auto-antibody has been demonstrated in some patients. The role of Chido in blood transfusion has been studied. The lytic antibody which lyses and agglutinates the cells of patients with Hereditary Erythroblastic Multi-nuclearity with a Positive Acidified Serum test is also being investigated.

Dr. Ezrin has been studying the adenohypophysis in the rat, and light and electron miscroscopy radioautography has shown that this organ is capable of appreciable mitotic activity.

At Sunnybrook Hospital, Dr. Cruickshank and Dr. Tam have established methods for measuring bone growth, and will be applying these techniques to the study of bone disease.

At the Toronto Western Hospital, Dr. Rabinovich has continued his work on metabolic bone disease, with particular reference to the forms of osteopathy associated with renal failure.

Dr. Conen at the Hospital for Sick Children has continued his studies of chromosome behaviour in lymphocyte and fibroblast cultures, and of chromosome radiosensitivity in patients with genetic chromosomal fragility. His use of fluorescence microscopy in nuclear sexing and chromosome analysis has been extended, and a simple technique is being developed. The study of amniotic fluid cell cultures has also been continued. Muscle structure has been found to be normal by ultrastructural and histochemical means in idiopathic scoliosis, but intense metachromasia has been observed in cultured fibroblasts from such patients. A similar effect has been observed in cystic fibrosis. In man, studies have continued on the fine structure of the Kultschitzky cells of the human lung, the parafollicular cells of the thyroid, and the development of the intrahepatic biliary system. All these studies are being carried out on foetal tissues. The behaviour of the Golgi apparatus in liver cells following a minor nucleocyte treatment is also being investigated.

At the Princess Margaret Hospital, Dr. Brown and Dr. Peters are studying their autopsied cases of Hodgkin's Disease, and with Dr. Allison are continuing to study the value of local and regional radiation in early Hodgkin's Disease. With Dr. Meakin, the value of ovarian irradiation and prednisone following surgery and radiotherapy for carcinoma of the breast is being determined. Dr. Laroye and Dr. Phillips are studying tumour antigens in human tumours, and Dr. Fornasier is establishing a technique for decalcifying tissues for electron microscopic study.

In the Medical Sciences Building, Dr. Fisher has continued his work on bile acid metabolism with Dr. Bloxam, and has carried on his work on ethionine metabolism. With Dr. Langer and Dr. Popovic he has begun studies of hepatic blood flow.

Working in the Department of Zoology, Dr. Bell has continued his study of chromosomal abnormalities in the newborn.

Division of Neuropathology

The following areas of investigation are currently underway:

(1) Histographic analysis of human muscle biopsy material in various diseases (Drs. Bouchard, Rewcastle, and Humphrey).

(2) A study of three patients with oculomyopathy where abnormal mitochondria with intramitochondrial crystaloid inclusions are demonstrable (Drs. Bouchard, Rewcastle, and Humphrey).

(3) The study of the structural changes occurring in Creutzfeldt-Jakob disease in the human and in the chimpanzee brain following transmission of this human CNS "degenerative" disorder. Two of the cases transmitted to primates are from the Toronto teaching hospitals. This study is being performed in collaboration with the Laboratory for Slow, Latent and Temperate Viral Diseases, National Institutes of Health, Bethesda, Maryland (Drs. Rewcastle and Deck).

(4) Further cases are being studied in an attempt to correlate anatomical-functional areas of the human thalamus following electrode stimulation and human response at the time of operation (Drs. Rewcastle, Tasker, and Armstrong).

(5) A biochemical–pathological study of a patient who died with striatonigral degeneration (Drs. J. Sharpe, O. Hornykiewicz, and Rewcastle).

(6) The lymphocytes from patients suffering from myasthenia gravis and polymyositis are being studied (Drs. R. Armstrong and R. Falk).

Division of General and Experimental Pathology

Dr. Movat continued his studies on the plasma kinin system, having isolated a low molecular weight highly anionic substance, which acts as activator of prekallikrein. He also continued with the studies on chemical mediators in PMN-leukocyte lysosomes.

Dr. Ranadive compared the enzymatic steps in the release of histamines from

mast cells, by cationic proteins derived from neutrophil leukocyte lysosomes and by antigen-antibody interaction.

Dr. Sadowski isolated, purified, and characterized severe bacteriophage-derived enzymes which degrade DNA.

Dr. Taichman, in collaboration with Dr. Ranadive, studied the effect of soluble immune complexes on PMN-leukocytes and continued his work on heterophile shock.

Dr. Udaka pursued the isolation of chemical mediators from inflammatory lesions and devised *in vitro* techniques to study the release of mediators from neutrophil and mononuclear leukocytes.

HONOURS

Dr. J.P. Bouchard has been awarded the Junior Essay Prize of the Canadian Congress of Neurological Sciences for his paper on "Histographic Analysis of Human Skeletal Muscle." This is only the second time the award has been made in three years since its inception, and Dr. Bouchard will present his paper at the Congress in Newfoundland, June 1971.

SCHOLARLY ADDRESSES

Dr. N.S. Taichman spoke on the potential role of hypersensitivity reactions in periodontal disease, to the American and Canadian Academies of Periodontology in Montreal, July 1970 and on tissue injury in inflammation and hypersensitivity to the American Academy of Oral Pathology in Washington, March 1971. Dr. Conen, Dr. Lewin, and Dr. Vakil reported on rapid Y chromosome identification in blood smears to the American Society for Human Genetics, in Indianapolis, Indiana, October 1970; Dr. Conen and Dr. Lewin on the accurate nuclear-sexing of amniotic fluid cells to the Royal College of Physicians and Surgeons in Ottawa, January 1971; Dr. Conen, Dr. Lewin, and Dr. Vakil on fluorescence Y test on blood smears to the Royal College of Physicians and Surgeons, Ottawa, January 1971; Dr. Conen and Dr. Higurashi on the *in vitro* chromosomal radiosensitivity in Fanconi's anaemia to the Society for Pediatric Research, Atlantic City, New Jersey, April 1971; Dr. Conen, Dr. Surana, Dr. Braudo, and Dr. Keith, on familial t(14q−; 1+?), meiotic nondisjunction and marker C chromosome, to The Society for Pediatric Research, Atlantic City, New Jersey; Dr. Conen, Dr. Surana, Dr. Salter, and Dr. Bailey on the partial trisomy C due to maternal paracentromeric break, to the American Pediatric Society, Atlantic City, New Jersey, April 1971; Dr. Conen and Dr. Chan, on ultrastructural observations on the cytodifferentiation of the parafollicular cells in the human foetal thyroid gland, to the American Association of Anatomists, in Philadelphia, April 1971; Dr. Conen, Dr. Hwang, Dr. Chan, and Dr. Balis, on unusual forms of cilia in the human foetal kidney to the Canadian Federation of Biological Societies, Toronto, June 1971; and Dr. Conen, Dr. Kegel, Dr. Czegledy-Nagy, Dr. Dalziel, and Dr. Nyberg on the micro-densitometric analyses of chromosome fluorescence, to the Genetic Society of Canada, Quebec City, June 1971. Dr. Rewcastle, Dr. Tasker, Dr. Richardson, and Dr. Emmers presented a paper on the anatomical correlation of detailed sensory mapping of human thalamus at the Fifth International Symposium on Stereoencephalotomy, Freiburg, West Germany, in September 1970; Dr. Rewcastle spoke on an unusual form of cerebral lipidosis in two brothers at the Annual Meeting of the Canadian Association of Neuropathologists, Ottawa, October 1970; Dr. Rewcastle organized a Symposium in the Recent Advances in Medicine Series at the Annual Meeting of the Royal College of Physicians and Surgeons of Canada, Ottawa, January 1971. The title was "Slow Viral Infections of the Nervous System," and Dr. Rewcastle presented one of the three papers. Dr. Rewcastle participated with Dr. J.E. Harrison, Dr. G. McNeill, Dr. M.A.R. Molla of the Department of Medicine and Physics of the University of Toronto in presenting a paper on radiation myelopathy of human subjects following thorotrast myelography at the Clinical Research Society of Toronto, May 1971. Dr. Rewcastle presented a paper on viral

encephalitis – histologic and E.M. studies, at the meeting of the Canadian Association of Pathologists and the Canadian Association of Medical Microbiologists, Saskatoon, June 1971, and Drs. Bouchard, Rewcastle, and Humphrey presented a paper on ocular myopathy with mitochondrial crystaloid inclusions at the meeting of the Canadian Congress of Neurological Sciences, Newfoundland, June 1971. Dr. Movat spoke on the activation of plasma prekallikrein to the Annual Congress of the Hungarian Physiological Society in Szeged, Hungary, July 1970; on the vascular phenomena of the acute inflammatory reaction and chemical mediators to the Department of Pathology, sophomore course in Pathology, University of Pittsburgh, Pennsylvania, September 1970; and on the acute inflammatory reaction, in the postgraduate teaching programme of the Department of Pathology, University of Montreal, January 1971. Dr. M.M. Fisher and Dr. M.J. Phillips presented a paper of sex difference in chenodeoxycholic acid metabolism in rats at the American Gastroenterological Association meeting in Miami, May 1971; Dr. Fisher and Dr. K. Miyai spoke on ethionine metabolism in the perfused rat liver and bile acid induced cholestasis in rats to the Canadian Federation of Biological Societies, Montreal, June 1970; Dr. Fisher and Dr. Miyai on the ultrastructural studies on the sinusoidal fat storing cells of liver, to the Canadian Association of Pathologists, Newfoundland, 1970; Dr. Fisher spoke at the Seventh International Congress of Electron Microscopy with Dr. Miyai on the influence of bile acids on biliary secretion; Dr. Fisher and Dr. Miyai presented a paper on bile acid induced intrahepatic cholestasis, to the Ontario Association of Pathologists in October 1970; Dr. Fisher and Dr. Miyai spoke on bile acid induced cholestasis in the rat at the 10th annual meeting of the American Society for Cell Biology, San Diego, October 1970; Dr. Fisher and Dr. Miyai presented a paper on hepatoxicity of chenodeoxycholic acid in rats at the American Association for the Study of Liver Diseases in Chicago, November 1970; Dr. Fisher spoke on the sex difference in bile acid metabolism in rats to the International Academy of Pathology, Montreal, March 1971; Dr. Fisher and Dr. Yousef presented two papers to the Federation of American Societies for Experimental Biology, Chicago, April 1971, the first on sex dependent differences in the bile acids of rats, and the second on the effect of ethionine on bile acid synthesis. Dr. M.C. Crookston, Dr. W.P. Rosse, and Dr. J.H. Crookston presented a paper on hereditary erythroblastic multinuclearity with a positive acidified serum test, to the 13th International Congress of Hematology, Munich, August 1970; Dr. M. Crookston spoke on human blood chimera with seeming breakdown of immune tolerance to the Annual Meeting of the Michigan Association of Blood Banks, Detroit, November 1970; on immunohematology as invited "teacher," at a teaching session of the Annual Meeting of the American Society of Hematology, San Juan, Puerto Rico, December 1970; spoke on cold agglutinins: iso- and auto- and an unusual blood-group chimera, to the Annual Meeting of the Pennsylvania Association of Blood Banks, Harrisburg, Pa., April 1971; Dr. M.C. Crookston and Dr. J.H. Crookston presented a paper on hereditary anaemia with multinuclear erythroblasts to the Fourth Annual Conference on the Clinical Delineation of Birth Defects, Baltimore, Md., June 1971. Dr. Silver attended the Third Ten-day Teaching Seminar of the Scientific Council on Epidemiology and Prevention of the International Society of Cardiology held in Dublin, August 1970 and took part in a Ciba Foundation study group on hypertrophic obstructive cardiomyopathies, held in London, England, September 1970. Dr. Silver presented papers at the Canadian Cardiovascular Society, Ottawa, November 1970, and the Ontario Association of Pathologists meeting, Toronto, October 1970, on the morphology of the human tricuspid valve. Dr. Silver spoke on the morphology of fascia lata heart valve prosthesis to the American Association of Pathologists-Bacteriologists meeting, Montreal, March 1971. Dr. M.J. Phillips gave a seminar on ultrastructural pathology of the digestive system at the Université de Montréal, February 1971. Dr. J.M. Sturgess presented a paper on experimental models of bronchial gland hypertrophy to the Annual Meeting of the Cystic Fibrosis Association, Atlantic City, New Jersey; with Dr. E. Katona and Dr. M.A. Moscarello on morphological changes in the Golgi apparatus after aminonucleoside, to the 14th

Annual Meeting of the Canadian Federation of Biological Societies in Toronto, and at the same meeting, a paper on perchloric acid – soluble fraction from rat liver Golgi after aminonucleoside.

PUBLICATIONS

ARMSTRONG, R.M. (with Koenigsberger, R., Millinger, J. and Lovelace, R.E.) "Central Core Disease with Congenital Hip Dislocation: Study of Two Families" (*Neurology*, vol. 21, 1971, pp. 369–76).

BHAGWAT, A.G., WENTWORTH, P. and CONEN, P.E. "Observations on the Relationship of Desquamative Interstitial Pneumonia and Pulmonary Alveolar Proteinosis in Childhood – a Pathological and Experimental Study" (*Chest*, vol. 58, 1970, pp. 326–32).

BROWN, T.C. (with Fitzpatrick, P.J. and Reid, J.) "Malignant Melanoma of the Head and Neck – a Clinico-Pathological Study" (*Proceedings of the Ontario Cancer Treatment and Research Foundation Conference on Selected Aspects of Skin Cancer*, Ottawa, 1970, pp. 21–31).

CONEN, P.E. (with Lewin, P.K. and Vakil, D.V.) "Rapid Y Chromosome Identification in Human Blood Smears" (*Canadian Medical Association Journal*, vol. 104, 1971, pp. 925–6).

CROOKSTON, J.H. (with Farquharson, H.A., Kinderlerer, J.L. and Lehmann, H.) "Hemoglobin Manitoba:α102 (G9) Senine Replaced by Arginine" (*Canadian Journal of Biochemistry*, vol. 48, 1970, pp. 911–14).

CROOKSTON, M.C. (with Tilley, C.A. and Crookston, J.H.) "Human Blood Chimaera with Seeming Breakdown of Immune Tolerance" (*The Lancet*, vol. 2, Nov. 28, 1970, pp. 1110–12).

CROOKSTON, M.C. (with Swanson, J., Yunis, E., Azar, M., Gatti, R.A. and Good, R.A.) "Lewis Substances in a Human Marrow Transplantation Chimaera" (*The Lancet*, vol. 1, Feb. 20, 1971, p. 396).

CRUICKSHANK, B. "Pathology of Ankylosing Spondylitis" (*Clinical Orthopedics and Related Research*, vol. 74, 1971, pp. 43–58).

CRUICKSHANK, B. (with McDonald, G.A. and Dodds, T.C.) *Atlas of Haematology*, 3rd ed. Edinburgh: Livingstone, 1970. Pp. 236.

CUTZ, E. and CONEN, P.E. "Ultrastructure and Cytochemistry of Clara Cells" (*American Journal of Pathology*, vol. 62, 1971, pp. 127–42).

FISHER, M.M. and PHILLIPS, M.J. "Sex Difference in Chemodeoxycholic Acid Metabolism in Rats" (*Gastroenterology*, vol. 60, 1971, pp. 742–7).

FORNASIER, V.L. "Haemangiomatosis with Massive Osteolysis" (*Journal of Bone and Joint Surgery*, vol. 52B, 1970, pp. 444–51).

KOLIN, A. (with Landi, S.) "Effect of Actinomycin D on the Tuberculin Skin Reaction in Guinea Pigs" (*International Archives of Allergy*, vol. 38, 1970, pp. 607–17).

MIYAI, K. and FISHER, M.M. (with Price, V.M.) "Bile Acid Metabolism in Mammals: Ultrastructural Studies on the Intrahepatic Cholestasis Induced in the Rat" (*Laboratory Investigation*, vol. 24, April, 1971, pp. 292–302).

MIYAI, K., RAICK, A.N. and RITCHIE, A.C. "Effects of Glucose on the Subcellular Structure of Rat Liver Cells in Acute Ethionine Intoxication" (*Laboratory Investigation*, vol. 23, 1970, pp. 268–77).

MIYAI, K. and RITCHIE, A.C. "Natural Resolution of Hepatic Ultrastructural Changes Induced by DL-Ethionine" (*American Journal of Pathology*, vol. 61, 1970, pp. 211–32).

MOVAT, H.Z. (with Russell, M.L. and Gordon, D.A.) "The Nature and Properties of Kinin-forming Substances in Synovial Fluid in Rheumatoid Arthritis" (*Proceedings of the Fourth Canadian Conference in Research in the Rheumatic Diseases*, Toronto, Oct. 15–17, 1970.

MOVAT, H.Z., MACMORINE, D.R.L. and TAKEUCHI, Y. "The Role of PMN-leukocyte Lysosomes in Tissue Injury, Inflammation and Hypersensitivity. VIII. Mode of Action and Properties of Vascular Permeability Factors Released by PMN-leukocytes during *in vivo* Phagocytosis" (*International Archives of Allergy*, vol. 40, 1971, pp. 218–35).

MOVAT, H.Z., POON, M.-C. and TAKEUCHI, Y. "The Kinin System of Human Plasma. I. Isolation of a Low Molecular Weight Activator of Prekallikrein" (*International Archives of Allergy*, vol. 40, 1971, pp. 89–112).

MOVAT, H.Z., URIUHARA, T., TAKEUCHI, Y. and MACMORINE, D.R.L. "The Role of PMN-leukocyte Lysosomes in Tissue Injury, Inflammation and Hypersensitivity. VII. Liberation of Vascular Permeability Factors from PMN-leukocytes during *in vitro* Phagocytosis" (*International Archives of Allergy*, vol. 40, 1971, pp. 197–217).

RANADIVE, N.S. and MUIR, J.D. "Similarity in the Mechanism of Histamine Release Induced by Cationic Protein from Rabbit Neutrophils and by Complement Dependent Antigen-Antibody Reaction" (*Proceedings of the Canadian Federation of Biological Sciences*, vol. 13, 1970, p. 13).

SCHNUDA, N.D. and SIMON, G.T. "Circulation of Small Lymphocytes in the Lymph Node" (*American Journal of Pathology*, vol. 62, 1971, pp. 66a–67a).

SILVER, M.D., ADELMAN, A.G., RANGANATHAN, N., WEBB, G.D., BIGELOW, W.G. and WIGLE, E.D.

"The Clinical Course in Muscular Subaortic Stenosis (M.S.S.)" (*Circulation*, vol. 42, suppl. 3, 1971, p. 127) (abstract).

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SILVER, M.D., GOLDMAN, B.S., SHUMAK, K.H., CARTIER, J., BIGELOW, W.G. and CROOKSTON, J.H. "Hormonal Antibody in Canine Cardiac Allograft Rejection" (*Circulation*, vol. 42, suppl. 3, 1970, p. 56) (abstract).

SILVER, M.D., GOLDMAN, B.S., TRIMBLE, A.S., SHEVERINI, M.A., TEASDALE, S.J. and ELLIOTT, G.E. "Functional and Metabolic Effects of Anoxic Cardiac Arrest" (*Annals of Thoracic Surgery*, vol. 11, 1971, pp. 122–32).

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——— "Morphology of the Human Tricuspid Valve" (*Circulation*, vol. 43, 1971, pp. 333–48).

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SILVER, M.D. (with Strasberg, S.M.) "Postoperative Hepatogenic Jaundice" (*Surgery, Gynecology and Obstetrics*, vol. 132, Jan. 1971, pp. 81–6).

SILVER, M.D. and TRIMBLE, A.S. "Morphology of Fascia Lata Heart Valve Prosthesis" (*American Journal of Pathology*, vol. 63, 1971, p. 90a) (abstract).

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——— "Experimental Glomerulonephritis Induced by Minimal Doses of Trypsin" (*Archives of Pathology*, vol. 21, March, 1971, pp. 193–200).

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PHARMACOLOGY

Under the direction of Professor W. Kalow

During the past year, the new curriculum for medical students has been implemented fully for the first time. Strong and weak aspects of the curriculum in regard to Pharmacology teaching were noted and improvements have been initiated. A course in Pharmacology for Arts and Science students was in its second year, given to a greatly increased number of students. The increased demand for the course could only partially be accounted for by the fact that it, with the necessary pre- and co-requisites, was scheduled to make the student eligible for advanced standing in medicine. The Pharmacology Course for students of Pharmacy under the direction of Professor Johnson was given to a class of double size because of re-organization within that Faculty. The Department offered seven graduate courses. New among these were: a Course on Behavioural Pharmacology under Professor Kalant, on Cardiovascular Pharmacology under Professor Spero, on Neuropharmacology under Professor Seeman, and on Biochemical Pharmacology under Professor Sen.

Professor H. Kalant resigned as Chairman of the Nervous System Committee, Period 1. Professor P. Seeman was elected to succeed him.

Professor A.K. Sen succeeded Professor Seeman as Graduate Secretary of the Department. A new committee was formed to deal with the organizational problems arising within the Department because of the multiplicity of undergraduate teaching tasks. Professor W. Roschlau was elected Chairman of this Committee.

The valuable summer student programme of the Department was organized by Professor J. Khanna and could be maintained through support from various sources. Special thanks for the support of the programme are due to Geigy (Canada) Ltd. and to Burroughs Wellcome and Co. (Canada) Ltd.

Business meetings of academic staff and graduate student representatives were held every first Monday of each month during the academic year. In addition, mid-month meetings were held to permit discussions of principal questions, including teaching philosophies and future areas of development in Pharmacology. The Graduate Affairs Committee of the Department, consisting of staff and graduate students, worked out new rules for admission procedures, academic supervision of students, and student evaluation within the Department.

The Department welcomed the following new staff members: Dr. A.B. Morris was appointed Professor, part-time. Dr. Morrison, who is Director of the Research Laboratories of the Food and Drug Directorate in Ottawa, made his experience available for undergraduate teaching, and for advice to the Department. Dr. T. Inaba joined the Department as Assistant Professor. He brings a special knowledge of chemistry for application in the fields of drug metabolism and toxicology. Dr. J. Duffin became a staff member of the Department of Anaesthesia and was cross-appointed as Assistant Professor in Pharmacology. He is a graduate of this Department, and will make his contributions in the area of neuropharmacology. Dr. H. Cappell has his doctorate in Psychology. He became a part-time Lecturer in Pharmacology and has contributed to the design and teaching of the new Graduate Course on Behavioural Pharmacology.

Professor E. Llewellyn Thomas took a leave-of-absence and was appointed, under the auspices of the World Health Organization, as a Visiting Professor of the University of Ceylon. Besides the teaching and organizational activities at that University, he devised a Compendium of Drugs to be used in Ceylon. Professor W. Kalow was appointed Co-chairman of a Site Visiting Committee of the National Institute of General Medical Sciences, U.S.A.

The Department of Pharmacology in collaboration with the Department of Anaesthesia sponsored an "International Symposium on Malignant Hyperthermia." This Symposium was held on Mary 14 and 15, 1971 in the Park Plaza Hotel, with 180 participants from the United States, Australia, New Zealand, Japan, England, continental Europe, and South Africa, besides the strong representation from various departments in this Faculty and from all over Canada. The successful organization of the Symposium by Dr. B.A. Britt and the financial support from Ayerst Laboratories and Abbott Laboratories Ltd. are gratefully acknowledged.

Graduate students have completed the following theses: for the Ph.D. degree – Gonzalo A. Bustos, "Studies on the Production of Fatty Liver Induced by Ethanol"; William C. Sturtridge, "Physiopathology of Calcitonin-Experimental and Clinical Studies"; Patricia Gail Pirie, "Thyroxine-Binding Antibodies and LATS Activity in Thyroid-Immunized Experimental Animals." For the M.Sc. degree – David Bailey, "*In Vitro* Studies with Chlorpromazine"; Katherine Lynne Hepburn, "Effects of Ethanol on Discrimination Behaviours in Rats"; John Edward Peachey, "Biogenic Amines and Behaviour in the Monkey."

VISITORS

Dr. O.H. Viveros, Department of Physiology and Biophysics, School of Medicine, University of Chile, Santiago, Chile: Dr. A. Tenenhouse, Department of Pharmacology and Therapeutics, McGill University, Montreal, Quebec; Dr. B. Witkop, National Institutes of Health, Bethesda, Maryland, U.S.A.; Dr. P. van Oordt, Zoologisch Laboratorium der Rijks-Universiteit, Utrecht, The Netherlands; Dr. S. Thesleff, Farmakologiska Institutionen, Lunds Universitet, Lund, Sweden; Dr. E. Beutler, City of Hope National Medical Center, Duarte, California, U.S.A.; Dr. C.M. Smith, Department of Pharmacology, State University of New York at Buffalo, Buffalo, N.Y.;

Dr. L.H. Piette, Department of Biochemistry and Biophysics, University of Hawaii; Dr. B. Grafstein, Department of Physiology, Cornell Medical College, New York, U.S.A.; Dr. R. Blostein, McGill University, Montreal, Quebec; Dr. C.W. Gowdey, Department of Pharmacology, University of Western Ontario, London, Ontario; Dr. F. Takenaka, Department of Pharmacology, Kumamoto University Medical School, Kumamoto City, Japan; Dr. P.C. Dandiya, Department of Pharmacology, S.M.S. Medical College, Jaipur, India.

RESEARCH

In Professor W. Kalow's section, Dr. B.A. Britt, Mrs. M. Terreau, and part of the time Dr. D. Stewart, Dr. T. Thomas, and Miss C. Haist pursued investigations into the causes of malignant hyperthermia, a rare but usually fatal complication of general anaesthesia, which occurs on the basis of a hereditary predisposition. Through the organizational efforts of Dr. Britt, it became possible to study in depth several survivors of a hyperthermia episode. Pharmacological and biochemical studies revealed a special susceptibility of intracellular calcium metabolism in skeletal muscle to inhibition by halothane. Since the findings offered logical prospects for developing a therapy, the investigators arranged for an "International Symposium on Malignant Hyperthermia" in Toronto. The exchange of ideas resulted in evidence which justifies the suggestion that procaine therapy should be attempted as a life-saving measure in those cases of hyperthermia which are accompanied by rigidity. Furthermore, the Symposium speeded up the local work which seems to lead to practical means of detecting the predisposition of endangered patients.

Dr. J. Brebner finished his work on tissue esterase by defining enzyme development in the human foetus and neonate and by studying the hydrolysis of demerol. The identification of genetic variants of plasma cholinesterase continued as a service to anaesthetists.

Dr. Zdena Harant started work on drug transport across the membrane cells in tissue slices, and in tissue cultures.

The Analytical Pharmacological Laboratory operated under the direction of Professors Kalow and Johnson, with Professors Carleton Hsia, T. Inaba, and D. Kadar as academic members, Mrs. H. Paul, Miss M. Kelly as technical staff, and Mr. A. Shum and Mr. D. Bailey as Graduate Students. In collaboration with Professor W.A. Mahon, the group completed a study on the metabolic disposition and the pharmacokinetics of doxycycline in patients with and without renal failure. In collaboration with Professor T. Zsoter, studies on the metabolic disposition of reserpine in hypertensive patients was begun. The data indicate a frightening persistence of the drug in patients with renal failure. Other studies in progress are assessment of drug metabolizing capacity of healthy subjects, drug transport in plasma, behaviour of cytochrome P450 in microsomal membranes, immuno assay of drugs not measurable directly by chemical or physical means, biliary excretion of drugs.

In the section of the Department headed by Professor E.A. Sellers the principal interest has continued to be the control of thyroid function and the relationship of the thyroid with catecholamine metabolism and action. Professor K.V. Flattery has been particularly interested in this latter subject. Her group has also examined the importance of brown adipose tissue in respect to survival and catecholamine excretion of rats exposed to 4° C. In adult rats, brown adipose tissue does not appear to play a crucial role either at room temperature or at 4° C. Dr. J.H. van Maanen and Dr. Gail Pirie Pogoriler extended their work on the affinity of thyroxine (and triiodothyronine) to antithyroid antibodies. By using ^{35}S as a label, Professor E. Schönbaum has been able to study the metabolism of propylthiouracil in intact animals. Professor M.-L. Desbarats-Schönbaum has used a series of thin layer chromatographic methods to separate the iodinated compounds found in the thyroid and other tissues. Professor W.I. Baba (formerly Professor of Pharmacology, Baghdad) has spent the past year in the laboratory and initiated an interesting study of the action of local tissue factors

(histamine, serotonin, bradykinin) on the release of iodine "label" from the thyroid. These tissue factors are present in mast cells, and Dr. Baba and Mr. I.M. MacDonald (Ph.D. graduate student) have observed a correlation between degranulation of mast cells and thyroid activity. The significance of these findings in normal function or in disease remains obscure. The fruitful collaboration with Dr. C. Ezrin (Departments of Medicine and Pathology) has continued. Thymidine labelled isotopically is taken up by the nuclei of pituitary cells "at rest" or in activity. The type of cell so labelled is established by radioautography using electron and light microscopy.

The addiction research group, under Professors H. Kalant, J.M. Khanna, and Y. Israel, has continued and extended its studies of metabolic effects and adaptive changes in the liver and central nervous system resulting from acute and chronic administration of alcohol, barbiturates, tranquillizers, cannabis, and other drugs. Work done using *in vivo* studies, incubated tissue slices, and isolated subcellular fractions of rat liver, has reinforced earlier findings that the drug-metabolizing systems in liver microsomes are quite distinct from the enzymes involved in alcohol metabolism, and do not interact with each other either. Neither acute nor chronic administration of ethanol affects directly the metabolism of drugs, and vice versa. In other studies, chronic administration of pyrazole (an inhibitor of alcohol metabolism) was found to increase greatly the accumulation of fat in the liver as a result of chronic alcohol administration. This result raises the important possibility of a direct chemical effect of ethanol on liver cell membranes, as opposed to an indirect effect of alcohol metabolism.

Adaptive changes in liver mitochondria as a result of chronic alcohol intake have been studied in several ways. Studies have been carried out with whole animals, perfused isolated rat livers, and incubated liver slices, before and after chronic alcoholic intake. Changes in the effect of alcohol on redox pairs such as beta-hydroxybutyrate: acetoacetate, on the effect of dinitrophenol on alcohol metabolism, and on the activity of catalase, all indicate that changes in liver mitochondria and microsomes occur, which may increase alcohol-oxidizing capacity, but which may at the same time contribute to the production of liver damage.

Studies of tolerance and dependence in the central nervous system have opened up important new avenues to understanding the biochemical and physiological mechanisms. Mr. A.E. LeBlanc and Dr. M.D. Willinsky, working in collaboration with Drs. R.J. Gibbins and C.D. Webster of the Addiction Research Foundation, have developed behavioural tests for accurate quantitative study of the development of tolerance to alcohol and to tetrahydrocannabinol (the active principal of marijuana). The time relations of tolerance and physical dependence have been studied in detail, and close similarities shown with learning and memory processes, including the ability of cycloheximide and of frontal cortex ablation to prevent both. At the same time, biochemical studies have followed the changes in ion transport mechanisms and acetylcholine release at different stages in the development of tolerance. This work is aimed at discovering the primary changes in the structure and function of cell membranes which give rise to the altered drug tolerance. Most recently, this work has been extended to a study of protein synthesis in the brain during the rapid production of tolerance by continuous intravenous infusion of morphine in mice.

With the co-operation of Professor O. Meresz of the Department of Chemistry, a quantity of ^{14}C-labelled tetrahydrocannabinol has been synthesized, and the pure material is being employed in studies of distribution and metabolism of the drug *in vivo* and *in vitro*. With the help of Dr. Willinsky, the time course of its tissue distribution, metabolism and plasma binding in rats are being explored before and after chronic administration of unlabelled tetrahydrocannabinol. The findings should help to explain the causes of the tolerance already observed, as well as the initial "reverse tolerance" which has been described in man.

The electrophoretic technique developed by Dr. K.J. Ryan for the isolation of synaptic vesicles and synaptosomes from brain is now being applied to the isolation of pure cell membrane fragments. If successful, this method will permit a more precise examination of the biochemical changes taking place during development of drug

tolerance, as well as some of the differences between the membranes of normal and malignant cells.

Dr. E. Llewellyn Thomas has been on sabbatical leave for the past year, and the work from his section is reported under the Institute of Bio-Medical Electronics.

Research in Dr. Derry's laboratory involved further studies on the function of brown fat in mammals including humans. Recent work has shown that brown fat can be converted to white fat and the only probable difference betwee the two tissues is in their sympathetic nerve supply. Other studies have shown that infant rats are very insensitve to noradrenaline. Detailed analysis of this finding has revealed that the α receptors of the rat are immature at birth but mature early in life to a constant number. The present work is designed to find out the function of the release of free fatty acids from brown fat during cold stress.

In Dr. L. Endrenyi's section, optimal designs were studied for binding and kinetic experiments which involve hyperbolic relationships. It was found that parameter estimates of a kinetic experiment with constant absolute error are most precise when the highest experimentally feasible velocity and one-half of this value are observed with approximately equal frequency. Binding experiments yield the most reliable parameters if the highest attainable fractional binding is observed at about equal frequency with one which is more than one-half of this value (the actual fraction depends on the dissociation constant). When the relative error of the measured velocity or of the concentration of the unbound substance is constant, about half of the observations should be made at the lowest possible concentration; the remaining measurements should be obtained at the highest possible concentration in kinetic experiments and, depending on the dissociation constant, at lower values in binding experiments.

In co-operation with Dr. J.T.F. Wong, new graphical methods have been developed for the identification of second-degree rate and binding functions. Some of these (modified Scatchart plots) point to second-degree relationships by their symmetry, others by their linearity. Application of these methods to experimental data on the binding of succinate to aspartate transcarbarmylase indicate that they are compatible with a second-degree allosteric mechanism, suggesting that the six subunits of the enzyme may interact in independent pairs.

Professor C.H. Hockman in collaboration with Mr. R. Besley studied (1) alterations in components of the auditory evoked response produced by psychotropic drugs. Expectancy, in human subjects, can be correlated with a negative surface component that follows the auditory evoked cortical response recorded with scalp electrodes. Recent studies in this section show that this potential is not altered by psychotropic drugs such as ethanol and sodium pentobarbital, whereas the components that represent auditory signal reception are markedly attenuated. (2) Central nervous system modulation of autonomic reflexes. In collaboration with Drs. Talesnik and Livingston, in continuing studies of CNS influences on baroceptor reflexes, it has been demonstrated (in cats) that reflex vagal bradycardia can be inhibited by electrical stimulation of a restricted region in the fastigial nucleus of the cerebellum and, in another series of related experiments it has been shown (with electrophysiological methods), that the carotid sinus nerve sends an afferent projection to this cerebellar region. (3) EEG and behavioural alterations by Δ^1-tetrahydrocannabinol. It has been found that the administration of Δ^1-tetrahydrocannabinol – the major active component of marijuana – to cats with indwelling electrodes produced a disruption of both the electroencephalogram and behaviour. Some of these alterations, including the appearance of a high-voltage slow wave pattern in the EEG in the awake and moving animal, have been observed in cats after other drugs known to cause hallucinogenic states in man.

Under the direction of Dr. G.E. Johnson, in addition to the work of the Analytical Pharmacological Laboratory (see Professor Kalow's report), studies have been conducted into the response of the sympathetic nervous system to cold exposure. It has been demonstrated that the destruction of most of the sympathetic nerves does not prevent the rat from meeting a cold stress with an increase in noradrenaline release.

It is apparent that the few remaining neurons are capable of "taking up the slack" and enabling the animal to survive.

The laboratory has co-operated fully with other scientists in Canada in studying problems related to thermogenesis. Collaboration was extended to a group from the National Research Council in Ottawa to study the influence of diet on thyroid function and sympathetic activity in rats kept at room temperature or exposed to 4° C.

Under the direction of Professor O. Hornykiewicz, the following research has been pursued in the Section of Psychopharmacology. (1) Studies on the metabolism of physiologically active substances in the normal and diseased human brain. (*a*) A new and very sensitive method has been developed for the assay of L-Dopa decarboxylase in the human brain; (*b*) the regional distribution of L-Dopa decarboxylase has been mapped out for the normal human brain; (*c*) in patients with Parkinson's disease the activity of L-Dopa decarboxylase in the caudate nucleus and putamen is greatly reduced as compared with non-Parkinson controls; (*d*) during chronic treatment of Parkinson patients with high oral doses of L-Dopa there is a preferential metabolism of L-Dopa to dopamine and homovanillic acid in the caudate nucleus and putamen. This finding provides, for the first time, experimental evidence concerning the mode of action of L-Dopa in Parkinsonism.

(2) Studies on the biochemical and pharmacological effects of L-Dopa in the CNS. L-Dopa-induced locomotor hyperactivity in mice was correlated with the increase in dopamine concentrations in the striatum. In contrast, there was no such correlation between the locomotor hyperactivity and change in noradrenaline, L-Dopa, and 3-0-methyl-Dopa levels in any brain area examined. It was concluded that the anti-akinesia effect of L-Dopa in Parkinsonism is most likely due to a preferential formation of dopamine in the striatum.

(3) Pharmacology of the striatal dopamine receptors. (*a*) A method has been developed to study the response, in the EMG, to a specific stimulation, by means of drugs (L-Dopa, apomorphine), of the dopamine receptors in the striatum. It has been possible to demonstrate that certain neuroleptic (antipsychotic) drugs have a potent blocking activity on the striatal dopamine receptors. However, in higher doses the neuroleptic drugs themselves seem to stimulate the dopamine receptors, and this paradoxic action may explain the abnormal involuntary extrapyramidal dyskinesias which sometimes appear during chronic high-dose therapy with neuroleptic drugs.

The research activities of Professor W.A. Mahon are reported under the Department of Medicine.

In Professor W.H.E. Roschlau's section research was primarily concerned with the function of blood platelets and their interaction with fibrinolytic agents. Specific projects were (1) a study of normal platelet adhesiveness in a large human population; (2) the development of a method to extract, purify, and stabilize soluble collagen for use in platelet aggregation studies; (3) further investigation of the inhibitory effects of fibrinolytic enzymes on blood platelet adhesiveness and aggregability.

Professor P. Seeman's section has (1) replaced the 75-year-old partition theory of anaesthesia by a theory which accounts for the different efficacies of different anaesthetics; (2) designed, synthesized, and is now testing a new and irreversibly-acting anti-psychotic drug. At present investigations are under way to find a brain fraction which specifically binds pain-relieving drugs. The group is also examining whether certain brain fractions have a tropic influence on denervated muscle.

Professor A.K. Sen, in collaboration with Mr. S.P. Banerjee, has made considerable progress in elucidating the mechanism of action of ethacrynic acid and its relation to $(Na^+ + K^+)$-ATPase activity in kidney. Ethacrynic acid is a highly non-specific reagent and exhibits a variety of biological activity *in vitro*. In the whole animal, however, its only prominent action is diuresis. This difference makes it difficult to give a biochemical basis for the pharmacological action of ethacrynic acid. Substantial evidence has been accumulated to suggest that diuresis induced by E.A. is probably mediated by the inhibition of $(Na^+ + K^+)$-ATPase.

The proposed "conformational change hypothesis" as the mechanism for ion translocation by the $(Na^+ + K^+)$-ATPase has been re-examined and further fortified

by using N-ethylmaliemide as a probe. The results indicate that N-ethylmaliemide can differentiate between the proposed two major conformational states of $(Na^+ + K^+)$-ATPase.

In collaboration with Mr. W.H. Knox, satisfactory progress has been made on the mechanism of action of aldosterone. Part of the cellular mode of action of aldosterone, the most potent endogenous mineralocorticoid in man, involves the active sodium pump, the biochemical manifestation of which is [Na + K]-dependent ATPase. The relationship between the pump and aldosterone has been investigated. Aldosterone enhances the ATPase activity and this stimulation appears to result from increased protein synthesis. To confirm these findings, the enzyme must be isolated and purified. Techniques are presently being developed to study radioactive amino acid incorporation into purified preparations.

In Professor L. Spero's section research has continued into the use of fluorescent hydrophobic probes as tools to determine conformation changes induced in membranes and membrane bound enzymes. It has been found that quenching of intrinsic chromophores, tryptophan and tyrosine, and energy transfer from these chomophores to an extrinsic fluorescence probe complete studies on probe fluorescence and have enabled Dr. Spero to demonstrate that local anaesthetics interact with the membrane in a number of different ways, and not with a single type of site, as had been postulated. In addition, the group have been able to determine a measure of the hydrophobic perturbation produced by the various families of anaesthetics, and these correlate well with the observed values of anaesthetic "efficacy" obtained by Seeman *et al.*

Using techniques similar to those described above, the aging processes in isolated red cell ghost membranes have been investigated. These are not consistent with a subunit structure for this membrane. Studies on aging in red cell membranes *in vivo* are under way and it is hoped to use these powerful fluorescence techniques to study pathological changes in membrane properties.

In collaboration with Dr. J.C. Hsia a new technique for determining the transmembrane flip-flop of spin labelled myristic acid has been developed. The effects of cations and local anaesthetics on this flip-flop have been studied and the technique shown to be more sensitive to changes in membrane fluidity than any other ESR technique. In addition, flip-flop in inverted ghosts has been determined and it has been shown that the ghost membrane is asymmetrical and retains its asymmetry when the membrane is inverted. It is hoped to apply this technique to the study of membrane bound enzymes which are known to translocate ions across the membrane, e.g., Na + K ATPase.

Research activity in Professor F.A. Sunahara's laboratory dealt with the investigation of the mechanism of prostaglandin action as it is related to the normal and hypertensive states. In experimentally induced hypertensive rats (Grollman method) both intravenous and intra-aortic administration of prostaglandin E_1 (PGE_1) caused a greater decrease in systemic blood pressure than in normal rats. It was inferred that the amount of degradation of PGE_1 in the pulmonary bed may be less in the hypertensive animal. These observations, however, were not specific for PGE_1 because other vasodilator agents (adenosine, papaverine) also elicited similar effects in hypertensive rats. It was previously observed that PGE_1 inhibited the vasoconstrictor response of topically applied norepinephrine (NE) in the microvascular beds of the rat. In the hypertensive rat, this phenomenon did not appear to be significantly different from the response observed in the normal animal.

In an effort to make a more detailed study, the interaction of PGE_1 and NE was investigated in the isolated vascular tissue (superior mesenteric vein). Results based on Rb^{86} efflux and mechanical responses in vein segments from various species indicate that PGE_1 and NE interaction is a cell membrane phenomenon and the contractile response in the vascular tissue to PGE_1 is independent of the effect on Rb^{86} efflux. Study further suggests that Ca^{++} required for the contractile response may be mobilized directly or indirectly by PGE_1 from some Ca^{++} stores.

A collaborative research project with Professor J. Talesnik on the effects of PGE_1

on coronary blood flow was also carried out. This study is being reported by Professor Talesnik.

In Professor Talesnik's section, the collaborative research project with Dr. Sunahara on the mechanism of coronary blood flow adaptation to changes in heart activity is under study in the isolated cat heart. Increased heart activity induced with noradrenaline (NA), adrenaline (A), isoproterenol (Isop) on endogenous release of catecholamines using dimethylphenylpiperazinium (DMPP) resulted in increased coronary flow of long-lasting duration. This appears to follow the pattern of the so-called metabolic vasodilation. This type of coronary vasodilation is greatly reduced when the heart has been infused with appropriate concentration of prostaglandin E_1 (PGE_1). PGE_1 in these concentrations does not affect the cardiac response (inotropic and/or chronotropic effects) produced by the administration of NA, A, Isop, or DMPP. The limited increase in coronary flow is partially compensated by a greater O_2 extraction, indicated by a marked prolonged reduction of the PVO_2.

Studies on the central nervous system modulation of baroceptor reflexes have continued in collaborative work with Drs. C.H. Hockman and K.V. Livingston; further details are to be found in Dr. Hockman's report.

Under the direction of Professor T.S. Zsoter, and in collaboration with Mr. F. Hart, the study on the effect of benzothiazide and chlorthalidone on the vessels has continued. These experiments in various species demonstrated an inhibition of norepinephrine induced vasoconstriction. The mechanism whereby these diuretics act on the vessels was studied last year. It is of particular interest to see if these drugs will alter the calcium availability in vascular smooth muscle for contractions. In association with Dr. G. Johnson and G. DeVeber in the Toronto Western Hospital a study on the effect of renal failure on the excretion of ^3H reserpine in hypertensive patients is being carried out. Investigations on the effect of diazepam and pentazocine on venomotor reflexes in man were concluded in the Toronto Western Hospital. In another study with Dr. M.P. Thirlwell, the effect of diazoxide on the peripheral circulation and particularly on the veins, was investigated.

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O. Hornykiewicz, "Histochemistry and biochemistry of brain catecholamines in extrapyramidal syndromes in man," Symposium Bel-Air IV, Monoamines et noyaux gris centraux, Geneva, Switzerland, September 14–17, 1970; "Neuropharmacologie des troubles moteurs extra-pyramidaux," Réunion Neurologique Franco-Allemande, Munich, Germany, October 8–10, 1970; "Dopamine and extrapyramidal motor function and dysfunction," Association for Research in Nervous and Mental Disease 50th Aniversary Meeting: Neurotransmitters, New York, December 4–5, 1970; "Extrapyramidal side-effects of psychotropic drugs," Department of Pharmacology, Laval University, Quebec City, February 25, 1971; "Studies on brain dopamine," Departmental Seminar, State University of New York at Buffalo, Buffalo, N.Y., March 2, 1971; "Recent studies on L-Dopa's metabolism in the Parkinsonian brain: Relation to its therapeutic and side effects," Seminar to Department of Neurology, College of Physicians and Surgeons of Columbia University, New York, March 3, 1971; "Dopamine and Parkinson's disease," Neuroscience Seminar, Mental Health Training Program in the Brain Research Institute, U.C.L.A., Los Angeles, California, March 10, 1971; "L-Dopa treatment in Parkinson's disease: Presence of L-Dopa and some of its metabolites in different brain areas," Symposium on Neurochemistry, Société de Chimie, Université de Montréal, Montréal, April 14, 1971.

Y. Israel, "Neurochemistry of Alcoholism," Round table conference on Neuro-

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A.K. SEN, "Mechanism of sulfhydryl reagents on $(Na^+ + K^+)$-ATPase," Department of Pharmacology, State University of New York Upstate Medical Center, Syracuse, N.Y., 1970; "Molecular basis of active transport of ions," discussant in Transmembrane transport session, International Congress on Biological Membranes, Gargnano, Italy, 1971; "Biochemical studies on (Na + K)-ATPase," Banff International Symposium on Comparative Endocrinology, University of British Columbia, Vancouver, B.C., 1971.

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PHYSIOLOGY

Under the direction of Professor R.E. Haist

In this past year the first presentation of Systems Teaching in Period 1 was completed and a part of the second trial was finished. The first attempt was in some ways disappointing and disturbing. It should be understood that the new curriculum is not an integrated curriculum, there being large blocks of all major subjects except Physiology and Pharmacology which have been split into Systems. This leaves the latter Departments without the overall responsibility for the teaching of their subjects and leaves the student without any major groups that have a continuing *direct* interest in them throughout the year. Also, this arrangement tends to split man and his functions into separate compartments instead of emphasizing man, as a whole. Each System Committee tried hard to provide the best, most complete course, despite the time allotted, and hence the amount of material presented to the student was great in relation to the time available. As a consequence, the student was given little time for reading and self-education. In some parts of the course that have been given a second time, it would appear that some improvement has been achieved, but with the rotation of Chairman of Systems Committees, there is great danger that the same mistake, of trying to give too much, may be repeated. It does not seem that the problems in medical education have been solved by this new arrangement of curriculum, and time alone can tell whether or not it is any better than the old.

One can say, however, that the *block* type of teaching has the effect of placing

a greater strain on the teachers, and the past year has been a difficult one for them. It is gratifying to see that, despite the heavier teaching load imposed by this new curriculum, the members of staff have continued to maintain the excellence of their research programmes and publications as will be seen in the next section of this report.

A number of video tapes, slide-tape presentations, and films have been prepared by members of the Department for use in teaching.

The total number of undergraduate students in all courses given by the Department was approximately 2500, with over 900 of these in laboratory classes. The number of graduate students was 41, of whom 20 were in the Ph.D. programme. Two students completed their Ph.D. programmes this year and five have completed their work for the M.Sc. degree. Of those receiving the Ph.D. degree, one now has a joint academic appointment between the School of Nursing and the Department of Physiology and the other is doing postdoctoral work in London, England.

We are grateful to a number of honorary members of the Department for their contributions to undergraduate and graduate teaching and other work of the Department. These are: Dr. F. Coceani, Dr. D. Fraser, Dr. B.S.L. Kidd, and Dr. S.W. Kooh of the Hospital for Sick Children; Dr. A.T Storey and Dr B.J. Sessle of the Faculty of Dentistry; Dr. R.J. Shephard, Department of Environmental Health; Dr. W.H. Johnson and Dr. J.M. Fredrickson of the Department of Otolaryngology; Dr. I.B. Fritz, Banting and Best Department of Medical Research; Dr. G.G. Forstner and Dr. N. Diamant of the Department of Medicine; Dr. R.C. Goode of the Ontario College of Education; Dr. G. Brown, Department of Psychiatry; Dr. J. Satterberg, Department of Psychology.

Many distinguished Scientists visited the Department. The following gave lectures or seminars or participated in discussions: Dr. S. Tarui, Osaka University; Dr. J.J. Kulikowski, University of Cambridge; Dr. M. Goodman,* University of Massachusetts; Dr. G. Werner,* University of Pittsburgh; Dr. S.J. Bleicher,* Downstate Medical Center, New York; Dr. R.W. Sperry,* California Institute of Technology; Dr. J.J. Dreifuss,* University of Geneva Medical School; Dr. H. Davenport, University of Michigan; Dr. M. Beznak,* University of Ottawa; Dr. G.J. Hetenyi,* University of Ottawa; Dr. D. Hatcher,* Queen's University, Kingston; Dr. G. Mogensen,* University of Western Ontario; Dr. J.A.F. Stevenson,* University of Western Ontario.

The following members of the University of Toronto gave seminars arranged by the Department: Dr. J. Satterberg, Dr. L. Marco, Dr. H. Kalant, Dr. E. Leblanc, Dr. F. Coceani, Dr. J.A. Lowden, Dr. G. Brown, Dr. J.J.B. Smith.

THESES COMPLETED

Ph.D. Theses

Coulson, Richard L. (1970), "Haemodynamic studies in the myocardium of dogs"; Hedlin, Anne M. (1970), "The effect of hormones on the fibrinolytic mechanism."

M.Sc. Theses

Field, David S. (1970), "Orotic acid induced fatty liver"; Gibault, Patrick Y.J. (1970), "Cortical influences on the medial division of the medial geniculate body"; Goodier, Jean E. (1970), "Effects of thyroid hormone on the metabolism of brown adipose tissue"; McAlpine, Valerie (1970), "The effect of exercise on the fibrinolytic system"; Schmitt, Adrianne (1970), "A study of the naturally occurring inhibitors to the fibrinolytic enzyme system."

RESEARCH

In Dr. R.E. Haist's section, Dr. B.J. Lin, with Miss Barbara Nagy and Mr. Anthony Sun, have been studying the influence of a variety of metabolic and hormonal factors

*Under the auspices of the School of Graduate Studies.

on the synthesis of proinsulin and the formation of insulin in the isolated islets of Langerhans of the rat, mouse and hamster. Dr. Lin has devised a means of studying the metabolism of substrates along with the synthesis of proinsulin and insulin and with Mrs. J. Coddling is studying the secretion of insulin by the isolated islets. With Mr. Sun, by fractionation studies, the site of transformation of proinsulin to insulin is being investigated and the factors determined which influence the transformation of proinsulin to insulin and the transit time from incorporation of label into proinsulin to the secretion of incorporated label into the medium. Mrs. J. Coddling has been involved in a number of studies concerning changes in insulin levels. Mrs. M. Merrilees has investigated factors influencing the action of insulin in muscle and has found an inhibitory activity in fresh, undialyzed rabbit serum which can be removed by dialysis, disappears after adrenalectomy, and can be simulated by the addition of adrenaline. Dr. M.A. Ashworth and Mr. Sun have been studying the influence of islet mass on islet function. Assistance has been given to the Department of Surgery in work on blood insulin changes in shock secondary to haemorrhage.

The major interest of Dr. Grayson and his group (consisting of Mr. R. Coulson, Mr. Brian Winchester, Mr. M. Robertson, Mrs. C. Scott, and Miss C. Morrison) is in the haemodynamic factors governing blood flow in coronary blood vessels and the effects of acute occlusion of a coronary blood vessel. They demonstrated that the major effects of occlusion, in the presence of alternative pathways, were due to a progressive decline in blood flow occurring as a result of increasing microcirculatory impedance. They have completed the experimental portion of a pilot study of haemodynamic changes in dogs made atherosclerotic by dietary means. The results are being analysed and studies will be made on the capacity of the damaged circulation to respond to physiological and pharmacological stimuli and will include an assessment of the action of vasodilator drugs and a comparison of the effects of occlusion of atherosclerotic and normal coronary vessels.

Dr. F.C. Monkhouse, with Mrs. Susan Milojevic and Miss Adrienne Schmidt, have carried out studies on the relation between plasma inhibitors to fibrinolysis and antithrombin activity. With Miss Valerie McAlpine a study on the role of exercise in activating the fibrinolytic system has been completed. Miss Anne Hedlin has continued her studies on the effect of hormones and oral contraceptives on the coagulation and fibrinolytic systems.

Dr. J.W. Pearce's group has continued a study of the factors which govern the response of the kidneys to altered body fluid volume. The work has delineated the role of altered blood viscosity and has also provided evidence of a blood-borne component of the mechanism controlling excretion of salt in the rat and the dog. This component does not originate in the kidney; its action is rapid enough to suggest that it is other than a well-known adrenal hormone. Studies indicate that body fluid volume is regulated in total, rather than by a simple adjustment of circulating blood volume and that this regulation is intimately bound to the adjustment of pressure in the veins.

Professor A.M. Rappaport (with Dr. S. Ohira, Mrs. A. Kalnins, and Mr. G. Empey) continued research on the effects of hepatic arterial ischemia as compared to portal venous ischemia on survival and metabolism of partially depancreatized dogs. Hepatic arterial ischemia without insulin treatment has greatly delayed the onset and duration of pancreatic diabetes. Experiments have been started together with Drs. J.M. Felts and P.A. Mayes of the Banting and Best Department of Medical Research to elucidate the change in hepatic fat metabolism occurring in depancreatized dogs after ligation of their hepatic arteries. Studies of the effects of various hormones (including insulin) on insulin output have been continued in an isolated and exteriorized portion of the pancreas together with Drs. R.E. Haist, S. Ohira, B.J. Lin, Mrs. J. Coddling, Mrs. A. Kalnins, and Mr. G. Empey. Work is continuing with S.J. Lipton and D. Morrison from the Institute of Bio-Medical Electronics on the development of their multichannel E.M. flowmeter; a newly constructed pickup elec-

trode that permits continued fluid contact with the vessel wall has provided excellent recordings of hepatic blood flow. The *in vivo* investigations of the role of the arterioles in the hepatic microcirculation has been continued.

Professors O.V. Sirek and Anna Sirek have continued experimental work along three lines. Mrs. M.E. Brosnan continued her studies of the effect of hypophysectomy on the composition of canine aorta. Hypophysectomy produced a rise in elastin and deoxyribonucleic acid content, and a marked reduction in polysaccharide content. Except for the DNA, these could be brought back to normal by growth hormone. The effects of oral hypoglycaemic agents such as tolbutamide and glybenclamide on the release of hormones other than insulin were studied in normal and hypophysectomized dogs. Dr. Nigishi Hotta, MRC Postdoctoral Fellow from the University of Nagoya, Japan, terminated his studies on the effect of dihydroergotamine and growth hormone on the isolated rat adipose tissue cell.

In Dr. D.W. Clarke's section studies have continued on fat and carbohydrate metabolism of isolated cerebral tissues of the rat with special emphasis on factors that might accelerate myelin breakdown.

Dr. J. Campbell with Dr. J. Pierluissi, Dr. K.S. Rastogi, Mrs. V. Lazdins, Mr. S. Koziak, Mr. D. Pournikfardjam, and Mr. G. Green investigated the metabolic effects of glucagon continuously infused in the rabbit; induction and nature of meta-somatotrophin diabetes in dogs; the radioimmunoassay of peptide hormones; set up methods for the measurement of the rate of biosynthesis of insulin. Effects of cortisol on the biosynthesis of insulin in the mouse and with Dr. G. Hetenyi, the effects of adrenalectomy and of treatments with cortisol and growth hormone, singly and combined, on insulin activity in the dog were studied. Methods were developed for the purification of murine growth hormone and metabolic effects of murine growth hormone in the mouse investigated.

In Professor P.E. Hallett's section, Mr. A.D. Lightstone has completed a device which measures horizontal eye movements to a precision of 1 min of arc, with an absolute positional accuracy of 5 min of arc over the range $\pm$ 20 deg as judged by trials with a model eye. It is now being tested on man and will be used on experiments in which eye position will be used to control target motion. Dr. Hallett has completed a wide angle, low power microscope which is to be used for viewing targets presented on a special oscilloscope.

Dr. J. Hunter's section has been studying abnormal glucose utilization, effects of catecholamines, and effects of free fatty acids.

Dr. J.T. Murphy's group is studying physiological control mechanisms in the activity of motor systems and the processing of sensory information by the cerebellum.

In Dr. H. Sonnenberg's section, studies have been carried out on the effect of maintained vascular expansion on distal tubular function of chronically salt-loaded rats, effects of different levels of hydration on renal response to blood volume expansion, and mechanisms of proximal glomerulo-tubular balance. Collaborative research with Dr. J.W. Pearce has involved an investigation of transferred natriuresis of blood volume expansion in pairs of cross-circulated rats.

In Dr. J.W. Scott's section, Mr. Patrick Gibault completed his portion of the study of the electrical activity of magnocellular division of the medial geniculate body. This work is being continued by Mr. Umberto de Boni. Dr. Marianne Seger is continuing the study of the representation of the semicircular canals on the cerebral cortex in the primate.

Professor M. Vranic (with Mr. Alan Cherrington and the help of Mrs. J. Wilkins) found that a ratio of molar infusion rates of insulin and glucagon near 2/6 increases markedly the turnover of glucose with small changes in glucose concentration in depancreatized dogs. The physiological significance of the concurrent release of these two hormones on glucose turnover was demonstrated in normal dogs infused either with glucagon or with arginine. The increased turnover of glucose was accompanied by a decreased release of fatty acid. Also in collaboration with Dr. K. Nor-

wich and with the help of Mrs. N. Kovacevic, infusions of unlabelled and labelled insulin are being used to validate tracer methods applying compartmental and non-compartmental systems analysis. With Dr. K. Norwich and Mrs. N. Kovacevic a new method making use of liquid gas chromatography and radioactivity monitoring is being developed to study turnover of individual fatty acids *in vivo*. With Professor G.A. Wrenshall the cause of deficient glucose utilization during exercise in depancreatized dogs on basal insulin infusion is being investigated.

In Dr. L.W. Organ's section the use of the Doppler ultra-sound principle as a technique for analysis of cardiac activity has been under study. A multidisciplinarian project involving this has been set up in association with the Department of Electrical Engineering.

Dr. D.R. Crapper's group has been studying the electrical and behavioural consequences of dissociated neuronal microtubules as an animal model of human Alzheimer's disease. Investigations at the level of the single cell, isolated neuronal networks, and the whole animal are being carried out. In collaboration with Dr. S.S. Krishnan and K. Ritze the concentrations of encephalopathic trivalent trace metals are being measured in various conditions involving human brain atrophy or dementia.

Dr. Roy Preshaw's group has been studying duodenal inhibitory mechanisms. They have been determining the distribution of secretin and CCK-like activity in the canine duodenum, the effect of carboxylic acids in the small intestine on canine pancreatic exocrine secretion, and the effect of sham feeding on blood gastrin levels in dogs.

In Dr. Margaret Santalo's section studies of the effect of the continuous infusion of adrenaline on insulin secretion by the rat were continued and an investigation of the possible effects of caerulein on the secretion of the endocrine pancreas begun.

Dr. D.H. Osmond has been studying factors influencing the biological activity of renin in normotensive and hypertensive states, including investigations of the phospholipid renin-inhibiting system. With Dr. David Tinker of the Department of Biochemistry, phosphatidyl serine from ox brain was found to be particularly active against renin.

The conversion of renin preinhibitor to inhibitor in plasma has been studied as well in normal and anephric animals. In collaboration with Dr. C. Hsia of the Department of Pharmacology, electron spin resonance studies have been carried out on erythrocytes of anephric patients. With Miss P. McFadzean a radio immunoassay for Angiotensin I has been developed and a method for Angiotensin II is being tested. Tests of plasma reinin activity have been carried out for diagnostic purposes in patients from several hospitals in the Toronto area.

Dr. R.C. Goode's group investigated the effects of hyperventilation upon fibrinolysis in man, the effects of hypoxia upon the central response to carbon dioxide, and the effects of hypoxia and hypercapnia upon auditory sensitivity. In addition, a simple technique for obtaining an index of cardiac output was developed at the request of the Coronary Unit of the Toronto General Hospital.

Dr. K.H. Norwich has been elaborating a mathematical theory of the kinetics of tracers within physiological systems. This approach differs from earlier attempts in that it is a fluid dynamic approach rather than a stochastic one. The description of the fluxes of labelled (and unlabelled) metabolites by means of vector calculus has resulted in the emergence of several new and useful formulae for computing "turnover" of metabolites. Dr. Norwich, with Professor G. Hetenyi (of the University of Ottawa), has been developing a combined experimental-theoretical approach to the understanding of the glucoregulatory mechanism, and in collaboration with Dr. K.N. Jeejeebhoy and Dr. A. Bruce-Robertson of the Department of Medicine, has numerically deconvoluted the experimental curves for specific activities of arginine-quandine $-^{14}C$ to obtain an undistorted measurement of the rates of appearance in the plasma of ^{14}C-labelled albumin, fibrinogen, and transferrin. Indicator dilution curves obtained by Drs. B.S.L. Kidd and P. Olley of the Hospital for Sick Children

have been corrected mathematically for distortion due to passage through a sampling catheter. The corrected curves provide a clue to the diagnosis of cardiac valvular incompetence With Dr. M. Vranic, Dr. Norwich is undertaking a combined experimental-theoretical investigation designed to develop and verify a method for calculating the rates of appearance of a metabolite in a physiological system which is not in the steady state condition.

HONOURS

C.H. Best, Sr. Academico Honorario Extranjero, Academia Nacional de Medicina de Buenos Aires; the Banting and Best Department of Medical Research established The Charles H. Best Postdoctoral Fellowship; appointed Honorary Patron of The Cheshire Home for the Disabled; the Dr. Charles H. Best School, Coquitlam, B.C. opened March 1971 by President of the University of British Columbia.

R.E. Haist, MRC Visiting Professor, Department of Physiology, University of Ottawa, March 1971.

J.W. Scott, President, Academy of Medicine, Toronto, 1970–71.

SCHOLARLY ADDRESSES

C.H. Best, "Fifty years of Insulin," to the Royal Society of London; "Insulin in retrospect and prospect," to the British Diabetic Association; "The future of insulin," to Medical Faculty, University of Leyden; "Diabetes and insulin," to Medical Staff and Scientists, Niels Steenson Hospital and Nordisk Insulinlaboratorium, Copenhagen; "The history of the discovery of insulin," to Medical Faculty and Medical History Society, University of Virginia, Charlottesville; "History of insulin and some aspects of the present situation," to The Rowntree Memorial Lecture, University of Miami; "The history of insulin – the present situation," to The Canadian Diabetic Association, Winnipeg.

D.R. Crapper, "Neurofibrillary tangles and altered electrical activity," Department of Physiology, New York State University at Buffalo, January 1971.

R.C. Goode, "Hypoxia, Ventilation, P_{CO2} and Exercise," to the World Congress of Sports Medicine, Oxford, England, September 1970; "The drives to ventilation in exercise," to University of Alberta, Edmonton, February 1971.

J. Grayson (R.L. Coulson and M. Irvine), "Reactivity of coronary anastomotic blood vessels," European Society of Microcirculation, VI Conference on Microcirculation, Allborg, Denmark, June 20–26, 1970; Observations on coronary blood flow following acute coronary occlusion in the dog," Canadian Cardiovascular Society, Ottawa, October 16, 1970; (C. Scott and B. Winchester) "Effect of nitroglycerine and dipyridamole in normal and atherosclerotic dogs," Annual Meeting of the Clinical Research Society of Toronto, Seaway Hotel, May 15, 1971.

R.E. Haist, "Factors affecting insulin action," to the VII Congress of International Diabetes Federation, Buenos Aires, August 1970.

P.E. Hallett, "Time course of the threshold disturbance caused by transients in background lighting," to the 6th Annual Symposium of the Center of Visual Science, University of Rochester (Symposium on Temporal and Spatial Factors in Vision), June 1970.

B.J. Lin (and R.E. Haist), "Islet respiration and proinsulin biosynthesis," VII Congress of International Diabetes Federation, Buenos Aires, August 1970.

F.C. Monkhouse, "The role of the multipurpose laboratory in systems-oriented teaching," Medical Education Group, Faculty of Medicine, University of Ottawa, May 11, 1971.

J.T. Murphy, "Limbic system function," Clarke Institute of Psychiatry; "The role of the amygdala in controlling hypothalamic output," University of Western Ontario; "The neurobiology of the cerebellum," University of Western Ontario.

K.H. Norwich, "Measurement of the rates of appearance of a chemical sub-

stance which is not in steady state with respect to this substance," Tracer Methodology group, Chicago, April 1971; "Basic studies on metabolic steady state. Incompletely mixed systems," International Symposium of Mathematical Biology, May 1971, Toledo, Ohio.

J.W. Pearce, "Concept of a natriuretic hormone," Lecture to the Department of Physiology, University of Western Ontario, October 1970.

A.M. Rappaport, "Role of the hepatic artery in the microcirculation of the liver," to the Regional Congress of the International Union of Physiological Sciences, Brasov (Roumania), August 10–16, 1970; "Effects of hormones and of changes in blood flow on the insulin output of the isolated pancreas *in situ*," to the Regional Congress of the International Union of Physiological Sciences, Brasov (Roumania), August 10–16, 1970; "The functional concept of hepatic structure," to the ixth International Congress of Anatomists, Leningrad (ussr), August 17–22, 1970.

A. Sirek, "Effect of adrenergic receptor blockades on insulin release after tolbutamide and HB418," vii Congress of the International Diabetes Federation, Buenos Aires, 1970.

O.V. Sirek, "Growth hormone and insulin," vii Congress of the International Diabetes Federation, Buenos Aires, 1970; "The lipolytic effect of growth hormone," Jewish Hospital and Medical Center of Brooklyn, 1971; "Metabolic studies with growth hormone," Diabetes Center, New York Medical College, 1971.

H. Sonnenberg, "'Natriuretic hormone' in the renal regulation of blood volume," to the University of New Mexico School of Medicine, Department of Physiology, Albuquerque, March 22, 1971; "Renal mechanisms for fluid volume regulation," Seminar, Department of Physiology, University of Arizona School of Medicine, Tucson, March 25, 1971.

R.R. Tasker and L.W. Organ, "Auditory pathway in human mid-brain and thalamus," American Association of Neurological Surgeons, April 1971, Houston, Texas.

M. Vranic, "Exercise and glucose turnover in intact, partially and totally depancreatized dogs on matched intraportal insulin infusion" (co-authors, G.A. Wrenshall and N. Kovacevic), viith Congress of the International Diabetes Federation, Buenos Aires, August 1970; "Insulin and glucose turnover in dogs" (co-author, G.A. Wrenshall), Joint meeting of the American College of Sports Medicine and the Canadian Association of Sports Sciences, May 10–12, 1971, Toronto.

PUBLICATIONS

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PREVENTIVE MEDICINE

Under the direction of Professor H.S. Gear

GENERAL

Policies for including preventive medicine in the undergraduate medical curriculum were outlined in the previous report. These require this subject to be considered as a philosophy rather than a specific collection of facts and opinions. Consequent upon this, the aim is to include the ideal of prevention in all relevant parts of the course throughout its four years. Thus, the main burden of presenting this concept is being placed upon the majority of teachers, whether in departmental teaching in Period III or in the various "Systems" and "Topics" in all three Periods. The present stage is one demanding a programme of negotiation with and persuasion of all to accept "preventive medicine" and to give it a place. This calls primarily for "teaching the teachers" and, through them, influencing all students.

Much time of the two departmental officers has been thus spent on continuing negotiation and discussion with such people as departmental chairmen, chairmen of "Systems" and "Topics" Committees, seminar leaders, hospital staff, etc., with these objectives in mind. There has been more willingness of such people to accept and apply the philosophy of preventive medicine than had been expected. Emphasis has, consequently, been given to features demonstrating preventive medicine in many parts of the "new" undergraduate curriculum. Many Systems and Topics during the past year have willingly accepted our proposals to this end.

A major advance in the policy of giving the whole curriculum a preventive bias was the number of cross-appointments to the Department of Preventive Medicine negotiated during the year. The hope is to appoint in each department, in each system and Topic Committee, and in each teaching hospital, one of its staff, by interest and keenness, willing to hold a watching brief for preventive medicine in his parent unit. Such an ambassador, selected from his own group, will generally be more effective in spreading the doctrines and practices of preventive medicine than an "outsider," however expert, added to it.

The process of establishing cross-appointments would have proceeded faster if a delay, required for a policy consideration by the other sponsor of the Department, the School of Hygiene, had not occurred. However, appointments have been made or are well advanced, both formally and informally, for the departments of medicine, surgery, and family practice, and for Period II groups in infections, and the musculo-skeletal, respiratory, circulatory, endocrine, and gastro-intestinal systems.

This process of negotiating cross-appointments will never cease as long as the undergraduate curriculum is undertaken by an organization of committees subject to continuing change and rotation in their membership. Allied to this is, inevitably, the need for the staff of the Department of Preventive Medicine to pursue ceaselessly the indoctrination of Systems and Topics Committees with new membership and with syllabuses constantly adjusted to new teaching needs. Indeed, in its obligation to ensure full acceptance of the philosophy of preventive medicine, the departmental staff has these ambassadorial and "watch-dog" functions as its major duties at present. Conversely, the two staff members were consequently not called on for any major teaching programmes even if they had been free to undertake these.

Meeting the immediate requirements of the "new" curriculum absorbed all the available time of the only two staff members. The member on the budget of the School of Hygiene was unable to assist much in the latter half of the year, owing to calls on his services for other programmes by that institution. Regrettably, nothing could be attempted in developing advanced training or research.

By policy decision. no programmes were undertaken in this field by this Department in the School of Hygiene.

PERIOD I – TEACHING

Apart from the inclusion of material of some relevance to preventive medicine in various Systems and Topics, certain subjects were given some attention during the year. One emphasized is of general importance, not only in Period I but for the ultimate better understanding of Periods II and III; this is the presentation of the concept of the range of dynamic human normal. Difficult though this is to define, either structurally or functionally, a student lacking an appreciation of the wide range of the "normal," the influence on it of many intrinsic ad extrinsic factors, and of its extension by training and conditioning, is at a disadvantage in recognizing and dealing with the "abnormal" in Periods II and III.

During the past academic year, one further need of preventive medicine in this Period was met by the inclusion of a statistical course of sixteen hours for those students without previous instruction in the subject. The Department nominated Dr. W.H. LeRiche to the responsible Committee and assisted in organizing the course.

PERIOD II – TEACHING

Special effort went into introducing adequate subjects and examples of a preventive medical character in as many syllabuses as possible of the various Systems and Topics. As this was relatively successful, this Period, at least in theory, accepted the claims of preventive medicine. However, some years will pass before teachers give as full and as knowledgeable an orientation to preventive medicine in their Systems and Topics as the Department will find satisfactory.

Invidious though it may be, three Systems and Topics gave signal recognition to preventive medicine in the past year – infections and the respiratory and musculoskeletal systems – though most Period II teaching had some reference to this philosophy.

The Co-ordinator of Period II, Dr. J.C. Laidlaw, and his Committee generously secured twenty hours of so-called *central time* during the year for use by preventive medicine to present some of its general requirements not covered by Systems teaching. This time was valuable in enabling Period II(a) students to receive a general introduction to the concept of preventive medicine and to the principles of epidemiology. Most specific epidemiology is featured in the various Systems curricula.

The new curriculum, as a whole, has yet to provide both time and method suitable to give students at least an insight into a number of important subjects lying outside Systems. In the field of preventive medicine there are several such subjects besides epidemiology and statistics, some of which will be indicated below.

PERIOD III – TEACHING

This Department also received much understanding of its claims from the Period Co-ordinator, Dr. Neil Watters, and his Committee. This was especially reflected in the time given to, and arrangements made for: (i) a partnership in teaching with the Department of Family and Community Medicine, and (ii) central seminar teaching of special subjects.

In due course, special effort will be necessary in discussing with the departmental Chairmen and their respective Period III education people the importance of granting more recognition to preventive features in the clinical teaching of this final year. It was not possible to pursue this objective this year because more urgent tasks required attention.

A useful preliminary advance was made with the policies and plans completed for the partnership with the Department of Family and Community Medicine to be practised in Period III. This arrangement has been accepted as a key to providing much of the philosophy and art of preventive medicine appropriate for the final clinical year. When the programme is put into effect, students should gain a sense

of many health and social factors influencing the origin of disease and disability, prevention, and treatment and rehabilitation of their victims. The intention to do much of this teaching "in the community" will then be valuable. The liaison between the two departments for this purpose is strong, with Dr. D.H. Johnson, representative of preventive medicine in the Department of Family Practice, being assisted by Dr. Milton Brown of our Department. This has ensured, inter alia, the role of auxiliary and related health professionals being brought to notice.

Much time had to be given to preparation of audio-visual presentations of preventive medical subjects in Central Seminars in Period III. In the past year, this was the only method available for introducing such features as delivery of medical care, principles of control of communicable diseases, occupational health, etc., which were outside Systems teaching. The experience of all groups, including these in preventive medicine, confirmed the desirability of seeking another arrangement for including such items in Period III. Central Seminars in hospitals were popular neither with students nor staff in all subjects, not only in preventive medicine. A proposal has, therefore, been put forward for the allocation of a block of 2–3 weeks for the exclusive teaching of such subjects and for activating the partnership of family practice and preventive medicine.

EXAMINATIONS AND EVALUATION

In that preventive medicine has a basic place as a philosophy colouring all the undergraduate curriculum, and not as a discrete academic subject examination, examinations must automatically be conducted by Systems and Topics groups to determine whether the preventive concept has been understood. Only a beginning to establishing this policy could be made, but enough has been learned to show that several years of briefing and teaching of teachers and students will pass before this will be fully understood and applied. However, some examinations in Systems did include questions or material with a preventive content or bias.

PUBLICATION

GEAR, H.S. "World Medical Education" (*Indian Journal of Medical Education*, vol. 9, June–July, 1970).

PSYCHIATRY

Under the direction of Professor R.C.A. Hunter

EDUCATION

The Department continued to carry out educational responsibilities to the undergraduate and postgraduate students of the Faculty of Medicine. In addition, substantial educational endeavours continued in both the theoretical and practical areas for a variety of mental health workers in the various clinical settings. These included students in nursing, occupational therapy, social work, psychology, child care work, etc.

Thirteen postgraduate students in Psychiatry were awarded the Diploma in Psychiatry. Professor John Hoenig of Memorial University was the External Examiner.

CLINICAL RESPONSIBILITIES

All the clinical facilities functioned at levels of increased efficiency, and several innovations were introduced which not only provided improved services to the mentally ill, but also yielded excellent teaching and learning opportunities. Amongst these

were: (*a*) The Acute Psychiatric Service of the Toronto General Hospital; (*b*) the re-organization of the Drop-In Services of the Clarke Institute; (*c*) the provision of psychiatric services to Ryerson Institute by St. Michael's Hospital; (*d*) the establishment of a Youth Clinic at the New Mount Sinai Hospital; (*e*) the provision of a short-stay unit at Sunnybrook Hospital; (*f*) a Drug Abuse Clinic at the Toronto Western Hospital; (*g*) a large number of new developments at the Hospital for Sick Children, too numerous to be mentioned singly.

NEW PERSONNEL

Although the Department experienced the predictable turnover of faculty during the year, special reference should be made to the following: (*a*) Dr. H.B. Kedward joined the staff of the Clarke Institute of Psychiatry as Head, Section on Psychiatric Epidemiology; (*b*) Dr. H.B. Durost accepted the post of Clinical Director of the Queen Street Mental Health Centre; (*c*) Dr. P.M. Yap resigned to become Chairman of the Department of Psychiatry, University of Hong Kong.

The Department wishes to record its deep regret at the death of Professors K.G. Gray and Paul Christie. Both these men contributed greatly to the Department.

RESEARCH

This is the second annual report of the Research Committee, Dr. P. Brawley, Chairman.

Child and Adolescent Psychiatry

The value of short-term hostel stay for adolescent girls is being examined, and the reasons for clinic dropout investigated by comparison of those who continue treatment and those who do not. The effectiveness of psychiatric consultation in a children's hospital is being evaluated in a one-year follow-up study. Other enquiries concern the psychological impact of burns and leukaemia. Attempts are also being made to use psychological assessment of child care applicants as a predictor of their success as child care workers. A comparison has been made of the response to residential treatment of wards of Children's Aid Societies and children who have been living with their parents. In addition, a longitudinal study is underway to investigate a number of variables which may determine response to this form of treatment. Family variables influencing the academic achievement of children in special education settings are being studied.

A variety of psychological investigations of autistic children are in progress, examining the use of operant conditioning procedures to establish social interaction skills and language. Perceptual deficits in these children and in retarded children are also being studied, as is the use of family therapy as a treatment method.

A further investigation examines parental characteristics in relation to neurological symptoms in childhood psychoses. Clinical and genetic studies in mental retardation are proceeding with the aim of achieving a clearer delineation and improved aetiological understanding of types of retardation.

Clinical Studies

Two endeavours are concerned with the classification of psychiatric disorder, one from an integrational standpoint, the other based on behavioural characteristics. A third study is attempting a quantitative assessment of behaviour and behavioural change, and another is trying to establish a classification of types of juvenile offenders and their parents.

The effectiveness of a mental health screening clinic is under review, as is also the usefulness of an in-patient milieu therapy programme. Further interest in treatment evaluation is demonstrated by a study examining psychodynamic changes resulting from psychoanalysis.

Other undertakings include examination of bodily pain, colour dream recall, language as a clinical index, and psychotic art.

Psychosomatic studies concern psychogenic influences in amenorrhea and on the outcome of myocardial infarction. Two projects are investigating the use of hypnosis in obesity.

The Major Psychoses

Schizophrenia is approached by a variety of viewpoints, with two psychophysiological studies examining the EEG, one in cross spectral analysis, the other through habituation of alpha attenuation. Possible genetic differences between process and reactive schizophrenia are investigated through examination for abnormal capillary development. Biogenic amine metabolism in schizophrenia is the focus of other research. In March 1971 several of these studies were reported at the Symposium on Research Strategies in Schizophrenia held at the Clarke Institute.

The effect of sociocultural factors on the expression of the major psychoses and psychogenic reactions is being studied, while another group is looking at ethnic variations in the manifestations of guilt in affective disorders, and the influence of cultural background. The relationship of thyroid hormone and biogenic amines to behaviour in recurrent affective disorders is under research scrutiny.

Alcoholism and Drug Addiction

A series of studies concern the alcoholic. These include the age of the spouse as an indicator of dependency, the numbers of alcoholic patients entering psychiatric hospitals and the reasons for admission, and the social alienation of the alcoholic in comparison with the non-alcoholic. EEG findings in a large sample of alcoholics and drug addicts are being surveyed in conjunction with clinical findings to determine the value of this investigative method as an indicator of brain damage.

Interest in drug abuse is manifest in a study of social and psychological factors in amphetamine abuse, and a comparison of out-patient, day care and in-patient treatment of drug users.

Biochemistry, Endocrinology and Metabolism

Investigations underway include radioimmunoassay for triiodothyronine and steroids, and studies attempting to isolate and purify monkey anterior pituitary hormones. Pineal and Growth Hormone regulation, and the relationship between hypothalamic catecholamines and thyroid function are also receiving attention. The neutral pathways regulating Growth Hormone and adrenal stress responses are being studied, while other projects examine the fine structure of monkey adrenal cortices and the median eminence. Endocrine circadian variables in affective behaviour patterns and the ability of serotonin to pass the blood-brain barrier are also under investigation. The conversion of dihydroxyphenylserine to norepinephrine is being studied.

Psychopharmacology

The use of Propericiazine in the treatment of obsessional illness is being evaluated. The effectiveness of Amitriptyline and Protriptyline in depression are under examination. Chlordiazepoxide and Amitriptyline are being compared in a neurotic depressive population. Psychological, neurological, and endocrinological changes in Parkinsonian patients treated with L-Dopa are being studied.

Neurophysiology, Neuropharmacology

Two researchers are interested in the effects of ECT, one utilizing brain scans, another examining its influence on cerebral haemodynamics. Other research is concerned with the cerebrovascular effects of psychotropic drugs and the use of REG in cerebral diseases. Another group has begun to investigate the action of psychomimetic drugs on serontonin-sensitive neurones in the Raphe and lateral geniculate nuclei.

Sexuality

Psychological studies examine the effects of relaxing stimuli and mild noise on the

sexual interest of homosexuals, and the aversion of homosexual and heterosexual males towards the non-preferred sex. Two other investigations examine gender identity, and one the sociological situation of homosexual males in heterosexual society. The effect of sexual and general arousal on verbal learning is considered and an analysis made of object preference order in sexually deviant males.

Sociological Studies
These include an examination of Rochdale College as a therapeutic community and the continuing East York Project, which investigates approaches to establishing a model community mental health network. Folk Illness and Folk Psychiatry in Trinidad are also currently under investigation.

HONOURS

Dr. H.B. Kedward, Visiting Professor in Social Medicine, Memorial University, Newfoundland.

Dr. O. Hornykiewicz, Vice-President, American Association for Research in Nervous and Mental Disease, 1970.

Dr. Q. Rae-Grant, President, Ontario District Branch, American Psychiatric Association.

Dr. P.M. Yap, Contributing Editor: Comments on Contemporary Psychiatry, Edited by Dr. J. Mendels, University of Pennsylvania; Consultant, Advisory Board of *Ethos*, edited by Professors Goldschmidt and Price Williams, University of California.

SCHOLARLY ADDRESSES

Dr. G.A. Baker, "Growth Inhibition of Bacteria by Phenothiazines and its Implications towards a Psychobiological Model of Schizophrenia," Symposium on Research Strategies in Schizophrenia, Clarke Institute of Psychiatry, March 1971.

Dr. J.M. Berg, "Aspects of Genetic Counselling in relation to Chromosomal Aberrations," 2nd Congress of International Association for Scientific Study of Mental Deficiency, Warsaw, August 1970; "Behaviour and Intelligence in Males with XYY Sex Chromosomes," 2nd Congress of International Association for Scientific Study of Mental Deficiency, Warsaw, August 1970; "Genetics of Mental Retardation," University of Western Ontario, February 1971.

Dr. E. Brown, "Pseudocyesis of Paradigm for Psychophysiological Interactions," Third International Congress of Psychosomatic Medicine in Obstetrics and Gynaecology, London, England, March 1971; "False Pregnancy: a Psychosomatic Phenomenon," Ontario Clinical Research Society, Toronto, May 1971.

Mrs. D. Burwell, "Meeting the Emotional Needs of Patients who Require Extended Care," Registered Nurses Association of Ontario, January 1971.

Dr. S.J.J. Freeman, "Shifting Priorities in Community Psychiatry," Ontario Psychiatric Association, January 1971.

Dr. K.W. Freund, "Phallometric Method," Workshop on Transsexualism, New Orleans, Lousiana, January 1971.

Dr. M.I. Gokcen, "Parental Aspects of a Comprehensive Treatment Program for Speech-Deficient Psychotic Children," Symposium on Research Strategies in Schizophrenia, Clarke Institute of Psychiatry, March 1971.

Dr. R.C. Hicks, "Psychological Aspects of Alcoholism," College of Family Physicians of Canada (Ontario Chapter), October 1970; "Treatment Modalities for Drug Abuse," Welland County Medical Association, April 1971.

Dr. O. Hornykiewicz (Dept. of Psychiatry and Pharmacology), "Histochemistry and Biochemistry of Brain Catecholamines in Extrapyramidal syndromes in Man," Symposium Bel-Air iv, Monoamines et noyaux gris centraux, Geneva, September 1970; "Neuropharmacologie des troubles moteurs extra-pyramidaux," Réunion Neurologique Franco-Allemande, Munich, October 1970; "Dopamine and Extrapyramidal Motor Function and Dysfunction," Association for Research in Nervous and Mental Di-

sease, 50th Anniversary Meeting, Neurotransmitters, New York, December 1970; "Extrapyramidal Side-Effects of Psychotropic Drugs," Laval University, February 1971; "Studies on Brain Dopamine," Department of Pharmacology, State University of New York, Buffalo, March 1971; "Recent Studies on L-Dopa's Metabolism in the Parkinsonian Brain: Relation to its Therapeutic and Side Effects," College of Physicians and Surgeons of Columbia University (Department of Neurology), New York, March 1971; "Dopamine and Parkinson's Disease," UCLA – Neuroscience Seminar, Mental Health Training Program in the Brain Research Institute, Los Angeles, March 1971; "L-Dopa Treatment in Parkinson's Disease. Presence of L-Dopa and Some of its Metabolites in Different Brain Areas," Symposium on Neurochemistry organized by the Societé de Chimie, Universite de Montréal, Montréal, April 1971.

Professor R.C.A. Hunter, "Commonly encountered Difficulties in Clinical Research on Schizophrenia," Symposium on Research Strategies in Schizophrenia, Clarke Institute of Psychiatry, March 1971; "Should Residencies be University Based?" Annual Meeting, American Psychiatric Association, Washington, D.C., May 1971.

Dr. H.B. Kedward, "Social Malfunction," Addiction Research Foundation, Toronto, January 1971; "Objectives and Teaching Programmes in Community Medicine," Conference of Community Medicine, Memorial University, Newfoundland, March 1971; "Study of the Social and Clinical Features of Chronic Psychiatric Patients in Great Britain and Canada," Clinical Research Society of Toronto, May 1971.

Dr. S. Levine, "The Speed User: Social and Psychological Factors in Amphetamine Abuse," Royal College of Physicians Annual Meeting, January 1971; "Draft Dodgers: Coping with Stress, Adapting to Exile," American Orthopsychiatric Association, Annual Meeting, Washington, D.C. March 1971.

Dr. H. Moldofsky, "Personality, Disease Parameters and Medication in Rheumatoid Arthritis," Allied Health Section of Arthritis Foundation, Annual Meeting, Detroit, Michigan, June 1970; "Occupational Cramp," XIV Annual Conference of the Society for Psychosomatic Research, London, England, November 1970.

Dr. Naomi I. Rae-Grant, "Broth without Bread," Ontario Psychiatric Association Meeting, October 1970; "Children's Mental Health Centres Act," Ontario Association of Social Workers, November 1970; "Tough Times and Tender Moments," Ontario Psychiatric Association Meeting, January 1971.

Dr. Quentin Rae-Grant, "Community Psychiatry in International Perspective," presented at Delivery of Service, Mental Health Conference, Hamilton and District, October 1970; "Fight, Fright or Flight – Discussion of the Manifestations and Management of Anxiety in Children," presented at Ontario Speech and Hearing Association, 12th Annual Convention, Toronto, November 1970; "Ideas to Action: Translation of the CELDIC Report," Keynote address for Council for Exceptional Children, Canadian Mental Health Association, Public Forum on the CELDIC Report, Kitchener, Ontario, November 1970; "Children's Services in Community Mental Health," presented at Seventh Operations Training Course, University of North Carolina, Chapel Hill, April 1971.

Dr. V.M. Rakoff, "Dramatic Experience and Personal Crisis," University of Victoria, B.C. August 1970; "Psychiatric Complications of Oral Contraceptives," Royal College of Physicians and Surgeons of Canada, Ottawa, January 1971; "On the Distinction between Artistic Creativity and Psychotic Thought Disorder," Art and Aesthetics Conference, Departments of Psychiatry and Psychology, University of Toronto, May 1971; "The Aged and the Nuclear Family," Maimonides Hospital, Montreal, May 1971.

Dr. W.E. Robinson, "Dependency Problems in Long Term Psychotherapy," Ontario Psychiatric Association, Toronto, January 1971.

Dr. W.J. Stauble, "Psychiatry in Trinidad: A Five Year Canadian Aid Project," presented at Ontario Psychiatric Association Annual Meeting, Toronto, January 1971.

Dr. P.G. Thomson, "Wordsworth: Psychoanalytic Study of his Creativity and its Decline," Canadian Psychoanalytic Society, Montreal, February 1971.

Dr. M. Tyndel, "Ethology and Psychiatry," Ontario Psychiatric Association, Toronto, January 1971; "Psychiatric Study of Young People Using Psychotomimetic Drugs Intravenously," National Research Council (Committee on Problems of Drug Dependence), 33rd Annual Scientific Meeting, Toronto, February 1971.

Dr. J.A. Walters, "Psychogenic Bodily Pain," General Scientific Session, Annual Meeting, Ontario Medical Association, Toronto, May 1971.

Dr. P.M. Yap, "Study of Culture-Bound Syndromes," University of Valee, Dept. of Psychiatry, Cali, Colombia, Sept. 1970; "Comparative Psychiatry," University of Nebraska, Dept. of Psychiatry, January 1971; "Some Questions of Theory and Method of Transcultural Psychiatry," University of Rochester, Dept. of Psychiatry, February 1971.

PUBLICATIONS

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RADIOLOGY

Under the direction of Professor R. Brian Holmes

The Department has for many years really consisted of two divisions, Diagnostic and Therapeutic Radiology. With the addition of Nuclear Medicine to the department of Radiological Sciences at the Toronto General Hospital and the formation of a joint division of Nuclear Medicine between that Hospital and the Hospital for Sick Children, some of the staff were transferred to the University Department of Radiology for their major faculty appointment. The creation of new departments of Nuclear Medicine at the Princess Margaret Hospital and the Women's College Hospital added more members to the newly emerging Division of Nuclear Medicine in the University.

The final stages in the organization of the Radiology Research Laboratory occu-

pied a prominent position in the activities of the department during the past year. Funding, including operating grants, Medical Research Council Development Grant, the Dean's fund, Atkinson Charitable Foundation, Ontario Cancer Foundation, Medical Research Council Fellowships and Traineeships amounted approximately to $238,000.00. The laboratories have been completed and all equipment installed. The staff has embarked on major research projects, and has begun to report on its work at various scientific meetings. During the past year the staff has increased from 2 to 11 persons and the pace of activity is now as originally planned, very wide, spanning the entire spectrum of X-ray imaging from electron production to the brain of the observer. Important contributions have already been made in such fields as analysis of radiologic optics of image formation, design characteristics of X-ray tubes, and definition of the role of fine focal spots in radiology. The formal opening ceremonies of the laboratories took place on June 7, 1971. Over 150 people attended the ceremonies which consisted of tours and demonstrations as well as exhibits of scientific material. The inaugural address was delivered by Professor Herbert L. Abrams, Chairman of the Department of Radiology at Harvard University, on "Renal Vasculature – Newer Concepts of Form and Function."

A very great increase in the Department's involvement in the Undergraduate curriculum produced a corresponding increased load on the teaching faculty. This was helped in part by provision of academic secretarial assistance in some hospital departments. The programme has been well received by undergraduate students. However, it continues to be under review and possible improvements are being studied. In preparation for the anticipated inclusion in the Period III Clerkship of a one week rotation in the Division of Therapeutic Radiology for teaching in oncology, some structural changes were instituted at the Princess Margaret Hospital to provide for study areas and facilities for the students.

The Postgraduate Programme in Diagnostic Radiology continues in an active way with some sixty students taking part. The curriculum and timetabling are in the process of alterations, keeping in mind the proposed changes in the Royal College regulations with respect to straight internships as well as the implications for the various in-course evaluations. The Department has adopted the policy of converting the various hospital based programmes into a fully integrated University programme aided by a Programme Co-ordinator.

Another step in the development of the Department has been the provision of a departmental office on the University campus. This will have several beneficial effects, not the least among which will be the full recognition of the truly academic aspects of the departmental function as opposed to the hospital service function. The presence of the office has also made feasible the establishment of the post of Programme Co-ordinator, mentioned above.

The relatively small size of the departmental budget in comparison with the surveyed contributions of the Department to the academic programme makes it difficult to do justice to our commitments; however, a slow improvemeent seems to be taking place.

During the year, the Department of Diagnostic Radiology was honoured by the following distinguished visitors: Dr. H.L. Abrams, Harvard Medical School, Boston, Massachusetts; Dr. M.J. Chamberlain, Birmingham, England; Dr. D.H. Cummack, Western General Hospital, Edinburgh; Dr. Harry Griffiths, Harvard University; Dr. Ian Kerr, Brompton Chest Hospital, London, England; Dr. R. McReady, Royal Marsden Hospital, London, England; Dr. R.E. Maltais, University of Montreal; Dr. H.D. Rosenbaum, University of Kentucky; Dr. E.G. Theros, Armed Forces Institute of Pathology, Washington, D.C.; Dr. David Trapnell, Westminster Hospital, London, England; Dr. H.M. Worth, Vancouver, British Columbia.

RESEARCH

Dr. R. Blend is investigating "The Application of Transverse Axial Tomography to the Skull."

Dr. J.E. Callaghan, with Dr. J.S. McGrail, is making an arteriographic study of traumatic change to the laryngeal cartilage.

Dr. J.E. Campbell and others are setting up a method of quantitative microradiography and quantitative fluorescent microscopy in order to use these methods in a study of patients with metabolic bone disease, beginning with early chronic renal failure. Dr. J.E. Campbell is studying the radiological picture of chronic pyelonephritis in the adult.

Dr. W.A. Cumming and Dr. S.W. Kooh are investigating "The Skeletal Changes and Renal Osteodystrophy." Dr. Cumming and Dr. C. Grant are working on "Compression Plate Fixation of Femoral Fractures in Dogs." Dr. W.A. Cumming is continuing Studies in Osteodensitometry.

Dr. J.W. Davidson is studying the application of Epidemiological Methods in Diagnostic Radiology using cholelithiasis as an example; and is studying the Pulmonary Complications of Lymphography. Dr. Davidson in co-operation with the Department of Pharmacology is undertaking work on the synthesis of polymers of iothalamate salts.

Dr. J. Halls is continuing a radiological–pathological review of specimens of Crohn's Disease in the colon. Dr. Halls, with Dr. E. Prokipchuk, is continuing a double blind study on the effects of imuran on Crohn's disease.

Dr. D.C.F. Harwood-Nash is making a roentgenographic study of "Intraspinal Mass Lesions in 200 Children"; he is also studying "The Radiology of Intracranial Arteriovenous Malformations in Children"; "The Cerebrogram"; "The Cerebral Abscesses in 135 Infants and Children." He has completed work on the "Diagnosis of Children's Eye and Optic Nerve Defects by Axial Hypocycloidal Tomography of the Optic Canal"; "Posterior Prolapse of a Vertebral Body in Children"; "Tomography about the Sella in Children." He is continuing work on a roentgenographic study of "Intracranial Neoplasms in 575 Children" as well as the 'Clinical and Radiological Aspects of Porencephaly." With Dr. Bruce Ross, he is studying "Lateral Facial Dysplasias." He has collaborated with Dr. S. Merin and Dr. J. Crawford in "The Application of Axial Tomography of the Optic Canals to Optic Atrophy."

Dr. A. Humphry is doing research with Dr. W. Wallace, on "Foreign Bodies on the Respiratory Tract." Dr. Humphry is studying "Aseptic Necrosis of Epiphyses in Children Following Steroid Therapy," and is doing a study on "Small Bowel to Small Bowel Intussusception."

Dr. H.E. Meema is collaborating in doing a 5-year follow-up study on bone mineral content in the radius; continuing the research on secondary magnification of bone radiography ("Microradioscopy") and participating with the Departments of Medicine, Surgery (Orthopaedics), and Pathology of the Toronto Western Hospital in a study of renal osteodystrophy.

Dr. E.N.C. Milne has completed a re-examination of the optics of X-ray image formation and the related derivation of modular transfer curves to the actual geometry of image formation. He has studied the application of morphometric techniques to the derivation of quantitative information directly from radiographs. Dr. Milne is currently studying the pulmonary microvasculature using X-ray Vidicon magnification techniques, tumour-vascularization following irradiation, the resolution capabilities of the X-ray Vidicon, as well as such other properties as quality of video-tape recording ability, and ability to distinguish between substances of closely similar atomic weight. He is working on a technique of making high enlargement contact radiographs of thin tissue sections and a developing system for maximum resolution plates. These will be used initially in studies of lymph node morphology at high magnification, and in the studies of microcirculation. He is collaborating with Dr. F.G. Pearson on muco-ciliary transport in transplanted canine lungs.

Dr. C.A.F. Moes is doing a "Radiological and Clinical Evaluation of Innominate Artery Compression of the Trachea." He is studying "Juxtaposition of the Atrial Appendages in Complete Transposition of the Great Arteries." Dr. Moes is making an "Angiocardiographic Evaluation of Types of Atrial Septal Defects." He is study-

ing "Tricuspid Bump" – diagnostic sign in the angiocardiographic diagnosis of tricuspid atresia; and "Plain Film Diagnosis in Congenitally Corrected Transportation of the Great Arteries." He is writing a case report, "Malformed Mitral Valve with Stenosis Simulating Left Ventricular Tumour"; and is writing textbook chapters entitled "Vascular Rings" and "Angiocardiography." Dr. Moes is investigating "Supravalve Pulmonary Stenosis with Associated Odd Facial Appearance."

Dr. P. McDonald is studying several facets of "Seldinger Arterial Catheterization in Children" – Prospective Clinical Study, Histologic Changes in the Artery, and Limb Blood Flow Studies During and After Catheterization. Dr. McDonald is working with Dr. Harwood-Nash and others on "Cerebral Blood Flow Studies."

Dr. N.L. Patt is reviewing the radiologic findings in drug addicts, and with Dr. F. Douglas is correlating the findings with the pathological and clinical findings.

Dr. B.J. Reilly with Dr. J.A. Lowden is continuing work on "Heredofamilial Abnormalities in Mucopolysaccharide Excretion Associated with Skeletal Defects." He is doing research on "The Gravity-Dependent Distribution of Atelectasis and Pulmonary Edema in Neonates with Respiratory Distress." Dr. Reilly and others are working on "The Pulmonary Changes in Neonates who Have Had Assisted Ventilation and Oxygen Therapy." With Dr. J.W. Davidson and Dr. H. Bain, Dr. Reilly is carrying out research in "Lymphangiectasis of the Skeleton."

Dr. D.F. Rideout is continuing a study of radiological investigation in tumours of the larynx with particular reference to tomography. Dr. Rideout, with Dr. R. Blend, is continuing study of investigation of tumours of the nasopharynx with particular reference to tomography. Dr. Rideout, in collaboration with the Radiotherapy Division, is carrying out an investigation of the relative merits of mammography and thermography with particular reference to detection of carcinoma in the remaining breast in patients who have already had mastectomy. He is participating in an international study of Hodgkin's Disease, Stages I and II; and is participating in a cross Canada study of the management and prognosis of Hodgkin's Disease, Stages III and IV, initiated in May 1971.

Dr. P. Samu is studying the theoretical and practical consideration of 16-mm film processing with comparative assessment of different films for cine fluorography. He is investigating the Angiomyocardiogram – a qualitative evaluation of myocardial perfusion by densitometric measurement. With Dr. J. Yao, he is continuing a review of Operated Coronary Arteriograms.

Drs. W.R. Sarjeant, J.C. Rowley, and J.E. Callaghan are collaborating with Dr. I. Macnab in a study on Chymopapain injection of the intervertebral discs. Dr. W.R. Sarjeant, in conjunction with Dr. J.E. Mullens is making an assessment of Arterial Supply to ileal transplants in the esophagus of experimental animals. Dr. W.R. Sarjeant, in conjunction with Dr. J. Rankin, is making an arteriographic assessment of renal transplants in dogs.

DIVISION OF THERAPEUTIC RADIOLOGY

The radiotherapy staff at the Princess Margaret Hospital participate in surveys of treatment methods, past and present, and often arising from these, prospective studies to determine the value of various modes of treatment in an attempt to obtain further improvement in the management of malignant disease. Some of these surveys and studies are listed and described below.

Breast Study

This study was initiated June 1, 1965, and still continues. The purpose is to determine the value of ovarian irradiation alone or plus small doses of Prednisone when added to the normal primary treatment by mastectomy plus irradiation of the operative site and lymph node areas. The intake to this study should be completed in 1971. This study is run in conjunction with, and co-ordinated by Dr. J.W. Meakin of the Department of Medicine.

Hodgkin's Disease

The Radiotherapy Department continues to participate in a study started in 1967 to explore the merits of local radiation treatment confined to involved areas only, against regional irradiation in the management of early (Stages I and II) Hodgkin's Disease. This is a co-operative study with about 22 centres in the United States.

Primary Brain Tumours

One study has been set up to study the effectiveness or otherwise of post-operative irradiation and by October 1970, 102 patients had been entered. This study is confined to astrocytomas since the numbers of other types of gliomas are small. No final result is yet available on this study.

A further study is being carried out into different radiation fractionation schedules and their effectiveness against glioblastoma multiforme, using treatment at 8-hour intervals and treatment at 24-hour intervals, as conventionally given. In addition, the 8 hourly treatments were given in two different overall periods of 1 week and 3 weeks.

So far no significant difference in length of remission has been noted nor has there been any increase in complications in the early post-treatment period.

A more recent study into the effectiveness of different fractionation schedules has recently started, comparing single 1000 rad treatments to 3000 rads in 15 treatments in the management of brain metastases.

Studies in Cancer of Head and Neck and Upper Respiratory Tract

(*a*) *Accessory Nasal Sinuses*

Following a previous report showing that pre-operative irradiation tended to improve the results, a more recent analysis of material of overall results and assessment of a new radiation method employing the Betatron confirm the value of pre-operative irradiation.

(*b*) *Carcinoma of the Larynx*

Although irradiation will cure over 90 per cent of early carcinomas, uncertainty existed regarding the best method for more advanced, but potentially curable disease. A previous report from this centre suggested that a combination of radiation and surgery gave better results, but a more recent analysis of 498 patients treated between 1961–66 suggests that a better policy is one of carefully planned radiation, reserving surgery for failure rather than using surgery as a definitive measure post-irradiation.

Gynaecological Malignancies

These common malignancies in the female involving cervix, endometrium, and ovary are all being reviewed at the present time.

A study has already been completed on the radiation management of Stage 2B and Stage 3 cervical carcinoma and other studies suggest that anaemia and hypertension are associated with a worse prognosis. These studies are continuing.

A review of experience with endometrial carcinoma is presently being undertaken, involving a survey of a large number of charts.

Ovarian carcinoma, which has the worst outlook of all the gynaecological malignancies, has been reviewed and ideas formulated for a prospective study in an attempt to improve their management.

Anoxic Irradiation of Limb Tumours

Studies are continuing on anoxic irradiation of tumours on limbs, especially soft tissue sarcomas and melanomas.

It is well recognized that areas of tumours are relatively low in oxygen and this is known to lessen the effect of radiation compared to its effect on normally oxygenated cells in tumour and normal tissue. By taking all tissue to the same level of anoxia and by giving a higher radiation dose than would be given under normal circumstances, it is hoped to obtain better results with these malignancies.

Study of Effect of Differing Fractionation Schedules
Studies on different fractionation schedules have been carried out on tumours in experimental animals in co-operation with the Department of Physics. These investigations are directed primarily at the problem of anoxia in tumours and studies on the effect of anaemia have been completed, showing a larger fraction of hypoxic cells in the experimental tumour. This work would have considerable clinical significance, as has been suggested from the analysis of anaemia in treated cervix patients.

Studies in detail on re-oxygenation in fractionated radiation continue, as do those on the quantitative changes in the hypoxic fraction of tumour cells when oxygen, oxygen and 5 per cent carbon dioxide, or hyperbaric oxygen is breathed by the tumour-bearing animals during radiation treatment. A further important line of investigation being pursued is directed at trying to relate the experimental findings to the clinical situation by studying tumours of different growth rate and histology.

Bladder Carcinoma
A study to determine any advantage in breathing oxygen at atmospheric pressure has shown no difference over breathing air in tumour control.

Rectal Carcinoma
Because of the high recurrence rate, particularly with the more anaplastic carcinomas, a study has been started and still continues into the effectiveness of preoperative irradiation. No results are available from this study at the present time.

Ewing's Sarcoma
The effect of adding total body irradiation in a single dose following irradiation treatment of the primary site seems to improve survival. This study has now extended treatment by adding chemotherapy for one year to see if further improvement is obtained.

Malignant Melanoma
A study has been made of all patients seen at this hospital between 1958-69 to review treatment methods and seek for factors which influence survival. As a result of this survey it has been decided to have as many of these patients as possible seen in one clinic by a small team so that more uniform treatment policies can be established.

Nasopharyngeal Cancers
A review is being conducted on 128 patients with primary malignancies in the nasopharynx as part of the overall review of head and neck cancer, but a final analysis is not yet available.

HONOURS

Dr. J.W. Davidson was visiting Lecturer to McMaster University.

Dr. D.L. Gilday was visiting Professor to Emory University, Atlanta, Georgia.

Dr. D.C.F. Harwood-Nash was visiting Professor to the Melincar Institute of Radiology, St. Louis.

Professor R.B. Holmes is President of Canadian Professors of Radiology and Director of the Radiological Society of North America.

Dr. D.L. McRae was visiting Professor to the Columbia Presbyterian Medical Center, New York, University of Tennessee, and the University of Wisconsin.

Dr. E.N.C. Milne was an invited participant to the N.I.H. Seminar on Derivation of Quantitative Data from Radiographs; was visiting Professor to the University of Minnesota, University of Colorado, University of Kentucky; is founding member and first Secretary-Treasurer of the Fleischner Society.

Dr. B.J. Reilly was visiting Professor to Dalhousie University, and to McGill University.

SCHOLARLY ADDRESSES

During the year 1970–71 the following addresses were given by members of staff:

W.E.C. ALLT, "Cancer of the Cervix," Symposium, Wayne State University, Detroit, Michigan, April 1970.

D.J. ALTON, "Cockaynes Syndrome: A Report of three Cases," Radiological Society of North America.

F.A. BEALE, "The Impact of Early Diagnosis in Cancer of the Cervix," Symposium, Society of Obstetricians and Gynaecologists, Jasper, Alberta, June 1970; "Radiation Therapy in the Management of Complex Skin Cancer Cases," Annual Clinical Conference, Ontario Cancer Treatment and Research Foundation, Ottawa, Ontario, November 1970; "Radiation Therapy in the Management of Malignant Tumours of the Para-nasal Air Sinuses," Refresher Course, Radiological Society of North America, Chicago, Illinois, December 1970.

R.S. BUSH, "The Growth Kinetics of Solid Tumours," Williamsburg, Virginia, February 1970; "The Biological Basis of Radiation Therapy," 18th Annual Meeting of the Radiation Research Society, Dallas, Texas, March 1970; "The Effect of Anaemia on the Fraction of Hypoxic Cells in an Experimental Tumour" (read by R.P. Hill), 10th International Cancer Congress, Houston, Texas, May 1970; "The Kinetics of Cell Reproductive Inhibition," 4th International Congress of Radiation Research, Evian, France, June 1970.

J.E. CALLAGHAN, "Angiomyolipoma," at the Canadian Medical Association of Radiologists, Calgary.

R.M. CLARK, "Thermography of Breast Tumours," American Thermographic Society, Atlantic City, New Jersey, June 1971; "Management of External Radiation Casualties," Canadian Forces Medical Service School, Base Borden, Borden, Ontario, February 1971.

R.F. COLAPINTO, "Recent Advances in Renal Angiography," Academy of Medicine, Toronto; "The Angiographic Diagnosis of Carcinoma of the Pancreas," Annual Meeting of Canadian Association of Radiologists; "Arteriography of Adrenal Tumours," Canadian Association of Radiologists; "Angiography in Experimental Strangulated Bowel Obstruction," Canadian Association of Radiologists.

W.A. CUMMING, "The Role of Radiology in the Investigation of Hypertension in Childhood," Canadian Association of Radiologists.

J.W. DAVIDSON, "Lymphographic Features and Epidemiological Aspects of Hodgkin's Disease," Third International Congress of Lymphology, Brussels; "Current Status of Lymphography," Toronto Radiological Society; "Current Status of Lyphography," Canadian Association of Radiologists; "Current Status of Lymphography," McMaster University.

P.J. FITZPATRICK, "Management of Epithelial Tumours of the Head and Neck," "Current Concepts in the Treatment of Breast Cancer," and "Investigation and Treatment of Malignant Lymphomas," North Cochrane Medical Society, Kapuskasing, Ontario, April 1971.

D.L. GILDAY, Special Plenary Session for Junior Investigators of the Society of Nuclear Medicine, Washington, D.C.; "Classification of Radiographic Artefacts," Johns Hopkins Medical Institutions Radiology Conference; "Pulmonary Embolism and Lung Scanning" and "Brain Scanning and Subdural Hematomas," Emory University; "Subdural Hematoma: Correlation of Brain Scanning and Cerebral Angiography and an Assessment of the Role of Nuclear Medicine," Society of Nuclear Medicine.

D.C.F. HARWOOD-NASH, "Tomography About the Sella," and "Acquired Cerebral Arterial Disease in Children," Third Symposium on Paediatric Neuroradiology; "Fractures of the Petrous Bone in Children," and "Tomography About the Sella," Millinckrodt Institute of Radiology, Washington; "Acquired Cerebral Arterial Disease in Children," American Association of Neurological Surgeons, Houston, Texas;

"The Cerebrogram," Association of University Radiologists, Durham, North Carolina; "Intracranial Arteriovenous Malformations in Children," "Intracranial Neoplasms in 575 Children," "Transverse Sinus Thrombosis and Mastoid Disease in Children," "The Ambling Artery of Adamkiewicz," American Association of Neuroradiologists, San Francisco, California.

R.B. Holmes, "The Role of the University in Community Health Care," Ontario Medical Association, District #3, Galt, Ontario.

A. Humphry, "Six years' Experience with Intussusception of Small Bowel into Small Bowel: Clinical and Radiologic Features," Canadian Association of Radiologists, Calgary.

R.D.T. Jenkin, "Medulloblastoma in Childhood," Annual Meeting, International Society for Paediatric Oncology, Lyon au Centre Leon Berard, Lyon, France, October 1970.

R.A. Lobb, "Value of the Chest Radiograph in Life-Applicant Assessment," to the Conference of American Life Insurance Medical Directors, Hot Springs, Virginia.

P. McDonald, "Hypertension and Renal Vascular Disease in Childhood," Canadian Association of Radiologists; "Renal Angiography in Children," Inter-American Congress of Radiology, San Juan, Puerto Rico.

D.L. McRae, "The Sella Turcica and Middle Cranial Fossa," "Radiological Anatomy of the Spine and Plain Film Diagnosis of Spinal Diseases," at the Columbia Presbyterian Medical Center in New York City; "The Significance of Bony Anomalies at the Craniospinal Junction," "Anatomical and Pathlogical Factors of Radiological Importance in the Spine," at the University of Tennessee; "Radiological Examination of the Spine and its Contents," at the University of Wisconsin; "Bony Anomalies at the Craniospinal Junction," at Madison, Wisconsin District Radiological Society.

H.E. Meema, "Improved Radiologic Diagnosis of Azotemic Osteodystrophy," to the Radiological Society of North America, Chicago; "Metabolic Bone Disease: Possibilities of Early Radiologic Diagnosis," to the Canadian Association of Radiologists, Calgary.

E.N.C. Milne, "False Images, Interference, Phase Shifts and Spurious Resolution in Routine Radiologic Practice – An Experimental Study," Association of University Radiologists Annual Meeting, Durham, North Carolina; "Symposium on Derivation of Quantitative Data from Radiographs," "Potential applications of Morphometric Techniques to Radiology," Association of University Radiologists; "Image Formation and Modulation Transfer Functions," Colorado Radiological Society; "Effects of Focal Spot Radiation Distribution on Image Formation," short papers on "Multiplexing Holography," "Long Distance Transmission of X-rays," "Nanosecond Exposures," and "Disposable X-ray Tubes," at the Aspen Conference on Radiology and the New Technology; "Distribution of Pulmonary Blood Flow and Lung Water in Chronic Obstructive Pulmonary Disease," Fleischner Society, Williamsburg; "Pulmonary Mechanics," Postgraduate Chest Course, Commonwealth University of Virginia, Williamsburg; "Fallacies in Primary Radiologic Magnification," University of Minnesota.

C.A.F. Moes, "Radiographic Findings in Innominate Artery Compression of the Trachea," Society for Paediatric Radiology, Miami, Florida.

M.V. Peters, "Hodgkin's Disease," University of Cincinnati, Ohio, February 1970; "The Lymphomas," School of Medicine, University of Chicago, Illinois, March 1970; "Lymphomas," Marquette School of Medicine, Milwaukee, Wisconsin, April 1970; "Historical Perspectives In Hogkin's Disease," 10th International Cancer Congress, Houston, Texas, May 1970; "Therapy of Lymphomas," 13th International Congress of Haematology, Munich, Germany, August 1970; "The Role of Lymphography in the Assessment of the Patient with Hodgkin's Disease," 3rd International Congress of Lymphology, Brussels, Belgium, August 1970; "Clinical Evaluation in Hodgkin's Disease," Medical Academy, Krakow, Poland, October 1970; "Clinical

Evaluation in Hodgkin's Disease," Medical Academy, Warsaw, Poland, October 1970; "Management of Early Breast Cancer," American Society of Therapeutic Radiologists, Phoenix, Arizona, November 1970.

B.J. Reilly, "Angiomatosis of the Skeleton," Society for Paediatric Radiology, Miami; "Iatrogenic Disease in the New Born," Scientific Basis of Medicine Lecture Series, Dalhousie University, Halifax, N.S.; "Osteomyelitis – A Two Year Survey," Dalhousie University and Atlantic Provinces Radiological Conference; "The Mandible in the Growing Child as an Indicator of Systemic Disease," Atlantic Provinces Radiological Conference; "Pathological Conditions in the Newborn Produced as a Result of Necessary Treatment," "The Differential Diagnosis of Metaphyseal Growth Disturbance," McGill University; "L'ostéomyelite – une réévaluation" and "Le développement du mandibule dans les maladies généralisées de L'enfance," La Société Canadienne-Française de Radiologie, Montréal, Québec; "Patterns of Pulmonary Involvement in the Idiopathic Respiratory Distress Syndrome," the Association of University Radiologists, Durham, North Carolina.

W.D. Rider, "Management of Metastatic Cancer," Seminar, Regional Medical Programme, Seattle, Washington, February 1971; "Radiotherapy in Management of Terminal Malignancy," Riverdale Hospital, Toronto, Ontario, February 1970; "Total Body Radiation in Management of Ewing's Tumour," National Institutes of Health, Bethesda, Maryland, March 1970; "Management of Head and Neck Cancer," Postgraduate Course, Faculty of Medicine, University of Toronto, Toronto, Ontario, May 1970; "Total Body Radiation," Postgraduate Course, Faculty of Medicine, University of Toronto, Toronto, Ontario, July 1970; "Total Body Radiation in Management of Ewing's Tumour," New England Roentgen Society, Boston, Mass., October 1970; "Some Viewpoints on the Role of Radiation Therapy," Oakville Trafalgar Hospital, Oakville, Ontario, November 1970; "Management of Choriocarcinoma," Department of Obstetrics and Gynaecology, Marquette Medical School, Milwaukee, December 1970; "Radiosensitivity: What Is It All About?" St. Joseph's Hospital Clinical Day, Milwaukee, Wisconsin, December 1970; Radiosensitivity – What Is It?" American Triological Society, Paradise Island, Nassau, January 1971; "A Trial of Orthobaric Oxygen as an Adjunct to Radiotherapy of Bladder Cancer," Duke University, Durham, North Carolina, February 1971; "The Status of Oxygen as an Adjuvant to Radiotherapy of Cancer," 10th Inter-American Congress of Radiology, San Juan, Puerto Rico, May 1971; "The Symptomatic and Haematological Disturbance Following Total Body Radiation of 300-rad Gamma-ray Irradiation," Oakridge Associated Universities, California, Total Body Radiation Symposium.

D.E. Sanders, "Radiological Signs in Obstructive Airway Disease," to the Toronto Tuberculosis and Respiratory Disease Association; "Radiologic Diagnosis of Pulmonary and Pleural Tumours," to the Royal Alexandra and University Hospitals, Edmonton; "Percutaneous Transthoric Lung Biopsy," to the Upstate Society of Thoracic Surgeons and Ontario Medical Association.

W.J.K. Simpson, "Advances in Cancer Diagnosis," Chapter Three of the Ontario Hospital Association Medical Records Librarians, Kincardine, Ontario, May 1970; "The Use of Intra-Articular Radiogold in the Treatment of Chronic Effusions of the Knee," Inter-Urban Arthritis Club, London, Ontario, May 1971.

J.R. Standen, "Radiological Clues in Diffuse Pulmonary Disease," at the Ontario Medical Association.

G. Wortzman, "Traumatic Cerebral Aneurysms," to the American Society of Neuroradiology, San Francisco.

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Colapinto, R.F. "Arteriography in the Diagnosis of Liver Tumours" (*Year Book of Cancer*, 1970, pp. 332–4).

——— "Bronchial Arterial Circulation Restored after Reimplantation of Canine Lung" (*Canadian Journal of Surgery*, vol. 13, 1970, pp. 243–50).

——— "Scintigraphy and Arteriography in the Diagnosis of Diseases of the Liver" (*Canadian Medical Association Journal*, vol. 104, 1971, pp. 989–92).

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——— "Diagnosis of Pulmonary Embolism—A Correlative Study of the Clinical Scan and Angiographic Findings" (*British Journal of Medicine*, vol. 3, 1970, pp. 67–71).

——— "Radiology Training Methods—A Resident's View" (editorial, *Journal of the Canadian Association of Radiologists*, vol. 22, 1971, p. 2).

——— "Sensitivity of Brain Scanning in the Detection of Arteriovenous Malformation" (*Radiology*, vol. 97, 1970, pp. 95–8).

——— "Subdural Hematoma: Correlation of Brain Scanning and Cerebral Angiography and an Assessment of the Role of Nuclear Medicine" (*Journal of Nuclear Medicine*, vol. 12, 1971, p. 358) (abstract).

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——— "Selective Angiography in the Diagnosis of Hydatid Disease of the Liver" (*Canadian Medical Association Journal*, vol. 103, 1970, pp. 1147–51).

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SURGERY

Under the direction of Professor W.R. Drucker

The full impact of Period II was felt this year. Most surgeons were involved, to varying degrees, as students were introduced to the study of mechanisms of disease with a strong emphasis on clinical correlation. For those surgeons who were committee chairmen and hospital co-ordinators (Dr. N. Delarue – Respiratory; Dr. R. Salter – Musculoskeletal; Dr. G. N. Ranking – Toronto Western Hospital) the degree of involvement was total. The co-operation of the many individuals in all departments who participated in the planning and conduct of the teaching ensured that this most critical phase of the new curriculum is now well and successfully underway. Student response has been enthusiastic and encouraging. Fruition of this phase of the educational programme was due in large measure to the undaunted leadership of the co-ordinator, Dr. J. Laidlaw.

Not all aspects of the new curriculum met with an enthusiastic response. The increased faculty time for planning and teaching is recognized as a necessary commitment to improve undergraduate education. Many clinicians would prefer a more equitable distribution of teaching time across the academic year. If this could be arranged, it would also reduce the requirement for a large number of patients with a particular illness within a short period of time. Clearly the role of patients in this phase of instruction deserves further study. Of possibly more concern is the discovery that certain topics are no longer included in the curriculum and that individuals highly qualified to teach have not been asked to do so. Such subjects as soft tissue wound healing, the burned patient, and the broad subject of maxillo facial injuries are not discussed. This problem will be a recurring one as the knowledge explosion continues. Coverage of all knowledge is out, but a continuing assessment of content is very much in. To this end it is hoped that each subject committee will prepare and maintain an up-to-date syllabus. This will allow a continuing review of curricular

content, faculty participation and it should help to publicize pedagogical methods found to be useful by various subject committees. No serious problem should arise, however, if reasonable dialogue can be established among individuals interested in the teaching of a particular subject. A healthy curriculum must be capable of continuing change and modification. The means by which change can be accomplished is inherent in the faculty organization for the new curriculum.

A long forward step in the undergraduate programme was accomplished by the Period III Committee under the able guidance of the co-ordinator, Dr. N. Watters. Their success in introducing a clinical clerkship has, as is frequently the case with advances in education, only served to focus attention on other problems. Instruction remains largely relegated to departments. Faculty goals for this phase of education are less well defined than for the preceding periods. A few attempts have been made towards interdisciplinary teaching and there is some evidence that this trend will accelerate as an outgrowth of the collaborative endeavours in Period II. Students have demonstrated a willingness and capacity to accept responsibility for the care of surgical patients when they are incorporated in a meaningful way as members of a clinical team. Complaints of long duty hours, excessive service load, and limited access to patients have decreased significantly this year. But with some notable exceptions there has not been optimal instruction specifically oriented to the needs and interests of students. Concern about clinical instruction is intensified by the requirements of accrediting agencies and long-term planning with a view to abolishing the internship. Insufficient time is allocated in this period for students to acquire reasonable orientation in all surgical specialties. This is a compelling problem for all clinical departments in most schools of medicine. Further division of time will only fragment the clinical experience to an even greater degree. A better definition of the goals and core content of the entire undergraduate clinical programme is necessary.

A committee to co-ordinate the undergraduate surgical programme with other disciplines in the teaching hospitals has been organized under the chairmanship of Dr. J. Palmer. Each member of this committee is appointed to an intra-disciplinary committee for education in his hospital. This newly developed committee has made a significant contribution by instituting a major modification in the method of examination for final year students in Surgery.

The residency programme is now recognized as a university responsibility. Judged in terms of satisfactory completion of the Fellowship examination it is a very successful educational endeavour. The sincere interest of Dr. O. V. Gray and his capable direction of this programme is largely responsible for its growing popularity. Applications for residency education of the highest quality and emanating from all parts of the world are far more numerous than can be accommodated. Each of the surgical specialties has now developed a university orientation with an inter-hospital co-ordinating committee that provides effective assistance in the selection, education, and evaluation of residents.

Several innovations are in progress in the residency programme. The surgical services at St. Joseph's Hospital and Toronto East General Hospital have been formally incorporated within the residency programme with the approval of the Division of Postgraduate Medical Education and of the Royal College for rotation of residents. There has been an enthusiastic response from the faculty and residents for inter-hospital rounds, instituted by both the divisions of Plastic and Urological Surgery. A committee representing all surgical residents was established this year to promote liaison between the Residents and the Surgical Faculty. Residents will become increasingly involved in the Clinical Clerkship as instructors in their own right rather than as substitutes. All residents are expected to assist in the continuing review of the Residency Programme, including evaluation of faculty participation. Initial response to this activity has been very helpful in planning residency education. The development of a straight surgical internship is hampered by the simultaneous change in the final undergraduate year and by the suggestion that all internships should be discontinued. Considerable opposition exists to a shorter period of residency education; quite likely more enthusiasm for this change will materialize as the clinical clerkship matures.

Dr. O.V. Gray has started a feasibility study to determine whether the first post-graduate year or two might be spent in a small community in general practice rather than in an internship. This would be a valuable contribution to a better distribution of physicians and it would have many educational advantages for an individual intending ultimately to narrow his interests to surgery. Other problems currently under study include the development of in-service examinations to assist in evaluation of the residency programme and residency performance; core accreditation by the Royal College for all residents prior to specializing in a division of surgery; a study of requirements for the number of graduates in each of the surgical specialties; and clarification of the role of research in residency programmes.

Research activity in the Department is beginning to flourish with the return of several young investigators who left this institution after completion of their residency education to study in laboratories elsewhere. The space provided for these investigators in the new Medical Sciences Building is an incomparable asset. Proximity to investigators in other disciplines is a constant source of stimulation and serves to ensure a high order of research work. Ultimately, the results of the investigations and the spirit of inquiry among the investigators will enhance the programmes in education and clinical care in the hospitals. Space for research, however, is urgently needed within all teaching hospitals to promote development of clinical research. A committee, chaired by Dr. W. Drucker, with representatives from all of the surgical specialties and the teaching hospitals meets monthly to co-ordinate and plan the development of research. Funds in support of research have been obtained from recognized granting agencies and from many generous private bequests. In several hospitals the surgical staff has committed financial support which has been a significant contribution to the growth of research in the Department.

Within this year the administrative structure of the Department has been thoroughly reviewed. The terms of reference of the Finance, Personnel, and Inter-Hospital Co-ordinating Committees and the Protocol for Increase in Residency Establishment have been revised. These changes have been unanimously accepted by the combined group of Surgeons-in-Chief and Chairmen of the Inter-Hospital Co-ordinating Committees. After helping to establish a Finance Committee and an Inter-Hospital Co-ordinating Committee for General Surgery, Dr. E.B. Tovee has resigned as Chairman of both committees. His contribution to the healthy growth of this Department is attested by the viability and recognized value of these committees. He has been succeeded by Dr. D. Bohnen (Finance) and by Dr. N. Watters (General Surgery). Dr. O.V. Gray has accepted the Chairmanship of the re-organized Personnel Committee, replacing the original Chairman, Dr. W. Bigelow.

At last the fearful acrimonious debates over finances in this School of Medicine appear to be quiescent with the inception of global budgeting and recognition that open-ended financing is passé. After five long years, the Surgeons-in-Chief of the hospitals and the Chairmen of the Inter-Hospital Co-ordinating Committees have unanimously approved the plan and terms for financing full and part-time members of the Department. Hospital administrators have been consulted, a variety of financial options are now available, and mechanisms are in effect to ensure a continuing review and revision as deemed necessary for all financial arrangements. The successful completion of this endeavour reflects the constructive intelligent and time-consuming work by Dr. D. Bohnen and members of the Finance Committee. Paramount is the hope that the financial arrangements will enable the entire Faculty in Surgery to work in unison to achieve their academic aims.

ACADEMIC VISITORS

The Department has received the following academic visitors over the past year: Mr. L. N. Allen, from London, England; Lord Brock, from the Royal College of Surgeons of England was a visitor to the Division of Cardiovascular Surgery; Professor William Burnett, from the University of Queensland, Brisbane, Australia; Pro-

fessor Gordon Cummings, from the Queen Elizabeth Hospital, Birmingham, England, visited the Division of Thoracic Surgery; Professor Horace Davenport, from the University of Michigan, was this year's Balfour Lecturer; Professor Charles Drake, from the University of Western Ontario, gave the Bruce Lecture; Professor W.F. Enneking, from the University of Florida, was a visitor to the Division of Orthopaedic Surgery; Professor E.A. Elebute, from the University of Lagos, Nigeria, was a visitor to the Division of Cardiovascular Surgery; Professor George Fegan, from the University of Dublin; Dr. John R.P. Gibbons, from the London Chest Hospital, London, England, was a visitor to the Division of Thoracic Surgery; Professor W.D. Johnson, from Marquette University, Wisconsin; Professor V.V. Kakkar, from King's College Hospital, London, England; Professor Andrew Kay, from the University of Glasgow, Scotland, visited us during his tour as a McLaughlin-Gallie visiting professor; Professor John Loewenthal, from the University of Sydney, Australia, visited us during his tour as this year's Sims Commonwealth Travelling Professor; Professor N.T. McPhedran, from the University of Calgary; Professor G.F. Murnaghan, from the University of Sydney, Australia; Professor Marshall Orloff, from the University of California; Professor W.B. Patterson, from the University of Rochester, New York; Professor John E. Rhoads, from the University of Pennsylvania; Dr. Rex Rothwell-Jackson, from St. Bartholomew's Hospital, London; Dr. Richard Schneider, from the University of Michigan, visited the Division of Neurosurgery; Professor John Spitzer, from the Hahnemann Medical College in Philadelphia; Professor David State, from Yeshiva University, New York; Professor Torg Stoog, from the University of Uppsala in Sweden; Professor Dean Warren, from the University of Miami; Professor Paul Yakovlev, from Harvard University, visited the Division of Neurosurgery.

In addition to the above-mentioned individuals, we received visits from the following groups: (1) the Academic Plastic Surgery Forum; (2) the North American Travelling Fellows, who visited the Division of Orthopaedics; (3) the Upstate Society of Thoracic Surgeons, headed by Dr. Harvey W. Kausel.

RESEARCH

Urological Surgery (Dr. C.J. Robson, Chairman)

Dr. C.J. Robson, in conjunction with Professor H. Kunov of the Department of Bio-Medical Electronics, is continuing the research on the electrical stimulation of the canine bladder on a grant from the Medical Research Council. Dr. W.K. Kerr, on a grant from the Ontario Cancer Research Foundation, is continuing his research into the production of bladder tumours in rats, with special reference to suspected carcinogenic metabolites. He also is conducting clinical research on the metabolic deficiencies resulting from I.N.H. therapy and special relation to Vitamin B6 deficiency. A clinical research project on the epidemiological factors in the incidence of genito-urinary tuberculosis since 1950 has been concluded and is ready for publication. Dr. G.A. Farrow is continuing his research on the auto regulation of the renal blood flow in the transplanted kidney, and on the immunosuppressive effect of Anturan on renal transplantation. Dr. J.L.T. Russell is continuing his clinical study on urinary diversions, and on an evaluation of a new sulpha drug on urinary infections. Dr. V.C. Colapinto is concluding a clinical study on trans-sphincter urethroplasties. Dr. Norman Struthers is conducting a laboratory investigation on the intrarenal pelvic and ureteral pressures in regard to certain drugs in dogs. Dr. P.O. Crassweller is continuing studies on renal transplantation, and on recurrent stone formation. Dr. M. Barkin, working at the Hospital for Sick Children, has successfully completed a project on preserving the viability of kidneys extracorporeally. He is continuing investigation under Medical Research Council support in immunological enhancement as applied to transplantation. Dr. R. Jeffs is continuing his studies on urinary tract infection in children with preliminary investigation of the biologically different child. Dr. A. Keresteci and Dr. J. Rankin are conducting a catheter infection study, the use of the Vogelfanger stapler in the auto-transplantation of dogs' kidneys, and also a laboratory

study of the pressure and flow measurements with nerve stimulation of the dogs' bladder.

Plastic Surgery (Dr. W.K. Lindsay, Chairman)

(a) Clinical

Dr. E.P. McDougall is studying reconstruction of the hand in quadriplegia. Dr. J.F. Murray is studying factors relating to the acceptability and usefulness of upper extremity prosthesis in the juvenile amputee and the role of surgery in the treatment of the rheumatoid hand. Dr. W.A. Brown is conducting a long-term study on temporal mandibular joint disease and on malignancies involving the pterygomandibular fossa. Dr. R.A. Newton is studying surgical tattooing in adults for the port wine stain. In collaboration with Dr. H.G. Thomson and Mr. Alex Wright of the Visual Education Department of the Hospital for Sick Children, he is comparing the results of this treatment in adults with those of children. He is also studying tendon sheath preparation by silicone rods as a means of improving the results of flexor tendon grafting. Dr. A. Freiberg is studying improved methods for finger tip injuries and another method of tendon sheath preparation with silastic rods to improve flexor tendon injury reconstructions. Dr. I.R. Munro is conducting a long-term follow-up study of temporal mandibular joint ankylosis in patients to determine the best method of treatment. He is conducting a multidiscipline study of all patients with hypertelorism from the surgical, opthalmological, social, and psychiatric points of view. A review of burns, 1966–70 utilizing an expanded form of computer analysis, is in progress to assess: (1) the use of topical Gentamycin to decrease morbidity and mortality and conversion of second degree to third degree in the burn wound; (2) the use of the weigh bed scale in major burns to relate change in weight to fluid balance; and (3) the use of environmental control to accelerate formation and separation of eschard. Dr. H.G. Thomson is studying: the effect of columellar lengthening as a primary procedure in the repair of bilateral complete cleft lips and cleft palate patients, the use of a sensory bearing flap in decubitus ulceration, surgical methods to reduce drooling in certain cerebral palsy patients, and a photogrammetric analysis of facial deformities. Dr. J.R. Birch has completed a study of the role of the patient's clothing in thermal burning, with a view to making recommendations concerning the use of flame retardant materials. Dr. W.K. Lindsay is studying: changes in the alveolus and maxilla following neonatal maxillary orthopaedics and the actual surgical repair of the cleft lip and cleft palate in patients. He is studying the anthropological morphology of cleft lip and cleft palate and the anthropological morphology of other cranial facial deformities in conjunction with Dr. L.G. Farkas. Dr. L.G. Farkas is studying the morphology of children with lateral facial dysplasia (first and second branchial arch anomalies) in different age groups.

(b) Basic

Dr. A.W. Farmer, working in conjunction with Dr. L.G. Farkas, is completing studies on the biological changes in preformed composite grafts used to replace tracheal defects. He is studying the development and fate of the surgical preformed tendon sheath by silicone rod implantation in following the insertion of free tendon grafts, using the chicken model in conjunction with Dr. W.K. Lindsay. Dr. W.K. Lindsay is continuing his long-term project on digital flexor tendon healing by completing a study of elastin changes within healing tendons under different experimental parameters. Dr. I.R. Munro is studying the growth of the face and cranium following osteotomies of the facial bones in animals preparatory to carrying out this work in humans with deformities such as that of Crouzon's, etc. Dr. J.R. Birch has studied the effect of ambient temperature and humidity on the metabolism of burned animals. Dr. H.G. Thomson is continuing his study on factors relating to hyper and hypo pigmentation in skin grafts and skin flaps and has an interesting project underway to study the acceptance of free autogenous transplants to pockets or regions which have been altered by inorganic material such as silastic. Dr. L.G. Farkas is studying wound healing during interuterine life.

Thoracic Surgery (Dr. F.G. Pearson, Chaiman)
Dr. F.G. Pearson has continued the prospective study of post-intubation tracheal injury in patients in the Respiratory Failure Unit at Toronto General Hospital during this past year. The protocol is in preparation for a randomized study using two new cuffed tracheostomy tubes. This study is to commence July 1, 1971 in the Respiratory Failure Unit. In the Thoracic Surgical Laboratory at the Medical Sciences Building, Dr. Pearson has completed the investigation on the transient defect in gas exchange following transplantation of the lung. During the past year, the methodology for tantalum bronchography as a method of studying muco-ciliary transport has been established and preliminary studies undertaken using this technique to study the affects on mucous clearance of lung transplantation, with particular emphasis on the effects of bronchial artery deprivation and autonomic denervation. Dr. R.D. Henderson continues clinical investigations in the manometry facility in the hospital, looking at the motor defects which are associated with ulcerative esophagitis and hiatus hernia. At the Medical Sciences Building, Dr. Henderson continues with a study of the fundamental mechanisms responsible for the prevention of reflux at the esophago-gastric junction. The dog is the experimental animal and the assessment is radiographic and manometric. Dr. Henderson, in co-operation with Dr. K. Jeejeebhoy is also looking at the effects of combinations of bile salts, acid, and pepsin in the production of ulcerative esophagitis in dogs, and is again looking at the motor disorder which ensues in the esophagus during esophagitis – and on subsequent healing. Dr. G. Taylor has his equipment and methodology in order in the Medical Sciences Building for the investigation of vasoactive materials released following platelet deaggregation in the shock lung model. Concomitant with these studies, the changes in lung mechanics which occur in the shock lung model are also being examined. Dr. R. Mitchell has a continuing study on abnormalities in ventilation and perfusion in the homotransplanted lungs in dogs. Dr. R.J. Ginsberg is currently on a McLaughlin Travelling Fellowship and working in a pulmonary research laboratory in Birmingham, England, under the direction of Dr. Gordon Cumming. Dr. Ginsberg is studying the bronchial micro-circulation using a Resin cast technique, and *in vivo* studies with the scanning electron microscope. Dr. Ginsberg will commence investigations in a laboratory at the Medial Sciences Building in July 1971.

Orthopaedic Surgery (Dr. F.P. Dewar, Chairman)
An active research programme is underway in each of the hospitals which is a division of Orthopaedic Surgery. Research activities are co-ordinated by an Orthopaedic Research Committee representing all units and chaired by Dr. Ian Macnab. Dr. F.P. Dewar is continuing to follow-up investigation on total hip prosthesis (Charnley type). In collaboration with Dr. J. Rathburn, a resident in Orthopaedics, he is conducting a survey of the long-term end results of an operative procedure which he designed eleven years ago to correct adolescent metatarsus primus varus and hallux valgus. A study has been completed on weight transmission through the knee joint and the treatment of infected un-united femoral shaft fractures. Additional basic projects in progress include: endoskeletal-transcutaneous prostheses in amputees; the use of a telemetry-computer system for the study of dynamic forces in lower extremity amputees; a study of blood flow in the skin of peripheral vascular disease states; development of a new knee disarticulation prosthesis; development of a total knee internal prosthesis; and, in collaboration with Dr. R. Jackson, the development of a torque testing machine for assessment of fracture healing. In collaboration with Dr. W.R. Harris, a study is in progress to follow up immediate post-operative amputee fittings. Additional clinical projects include the follow-up study of adult scoliosis, and the assessment of the cast-brace in the treatment of femoral shaft fractures. Dr. R.W. Jackson is continuing an active investigative programme which includes: a continuing study of a biomechanical nature into the physical properties of normal bone and the investigation of various factors (e.g. disuse, anticoagulation, phosphate supplementation) on the fracture healing process; the potentially destructive effects of athermal doses of electromagnetic energy in the microwave band on malignant

tissues studied both *in vitro* and *in vivo*; the biocompatability of a new bone cement (Zinc Polycarboxylate – PAZ) both *in vitro* and *in vivo* and clinical investigation of joint pathology as revealed by arthroscopy. Dr. W.R. Harris, in collaboration with Dr. M.M. Hussain (Colombo Plan Fellow), is reviewing the immediate post-operative fittings of amputees in a retrospective and prospective study. Dr. Edward H. Simmons is conducting a biomechanical and clinical study of anterior spinal instrumentation, in conjunction with Dr. E.A. Sue-A-Quan and Mr. H. Garside, a continuing study on cryosurgery in the treatment of neoplasms of bone and soft tissue, using V X 2 carcinoma (in conjunction with Dr. E.H. Flowers, Dr. H.M. Coleman, Dr. T.W. Barrington, and Dr. D.C. Evans); a clinical and radiographic assessment of cavovarus feet deformities (in conjunction with Dr. E.H. Flowers); and a biomechanical and clinical investigation of the possibilities of total replacement arthroplasty of the knee joint (in conjunction with Dr. I.J. Harrington). Dr. D.E. Hastings is studying the anatomy and functional classification of rheumatoid hand deformities. He has reviewed the use of knee arthroplasties in rheumatoid arthritis and is now studying the mechanics of rheumatoid wrist deformities and the use of a knee stress machine for clinical evaluation of athletic injuries. Dr. Schatzker is studying the holding power of orthopaedic screws in bone under static and dynamic loads, the healing of experimental osteotomies of the canine odontoid, the natural history and complications of fractures about the shoulder joint, the evolution of the normal blood supply to bone, and is continuing his study of the AO methods of internal fixation. Dr. Ian Macnab is conducting a clinical follow-up of Chymopapain in the treatment of herniated intervertebral disc, an exceptionally important study because of the possibility of treating discogenic back pain by means other than surgery. He is also studying the tissue reaction to embedded plastics, the bonding of living structures to porous metal implants, and, in conjunction with Prof. Ray Woodhams in the Division of Plastic Chemistry and with the assistance of Dr. Alan Osborne, he is attempting to develop a fibrous composite as an implant material having approximately the same elastic modulus of bone but a far greater tensile strength. Dr. R.B. Salter is continuing his experimental study of the effects of intra-articular salicylates in living articular cartilage and on models of arthritis (with the assistance of Dr. Mervin Fouse). His clinical investigations include studies of the pathogenesis and prevention of valgus deformity following fractures of the proximal metaphysis of the tibia in children (with the assistance of Dr. Trevor Best), and a new method of iliopsoas muscle release in the treatment of hip flexion deformity associated with the spastic type of cerebral palsy (with the assistance of Dr. Ariobaldi de Castro). Dr. J.E. Hall is continuing a programme of study in the Prosthetic Research Training Unit of the Ontario Crippled Children's Centre, and is continuing his studies of a new operative procedure for hyperlordosis of the spine, and a study of pulmonary physiology in scoliosis. Dr. W.P. Bobechko is studying the reactions of articular cartilage concerning rejection responses, septic arthritis, and transplantation. The inflammatory reaction in Legg-Perthes' Disease is under investigation utilizing lymphangiography. He is continuing with his work on the design of new braces for children with spina bifida and cerebral palsy. Dr. Mercer Rang is conducting a basic study on the anatomy of the subtaler joint, and is studying new methods of treatment for patients with cerebral palsy affecting the upper extremities. Dr. J.D. Graham, in co-operation with the Faculty of Engineering, is studying the mechanism of load transmission and lubrication of articular cartilage. Dr. J.P. Kostuik is continuing his study of the feasibility of intraosseous implantation of internal prosthetic devices and its possible application to human amputees, and a study of the forces transmitted during the stance phase of gait in lower extremity amputees. In collaboration with Dr. W.R. Harris he has devised an apparatus for the *in vitro* testing of force transmission through vadaveric knee joints. Dr. A.M. Wiley is continuing his basic studies upon the transplantation of articular cartilage (in collaboration with Dr. M. Young) in work financed by the Geriatric Research Society and the Rehabilitation Foundation. In collaboration with the Renal Metabolic Unit, he is studying bone biopsy to evaluate changes in the skeleton in

patients undergoing renal dialysis and in patients having end stage renal faillure or after renal transplantation. In collaboration with Prof. K. Piekarski of the University of Waterloo, he is studying the construction of a new type of artificial hip. In collaboration with Prof. R.E. Jervis, Department of Nuclear Chemistry, he is studying the tissue reactions around certain metallic implants used in orthopaedic surgery. Clinical studies include a review of the fractures of the dorsolumbar spine in more than 700 patients, and the natural history and the effects of surgery on the rheumatoid hand. Dr. T.A. Wright is reviewing the experience of total hip replacement at the Toronto Western Hospital. Dr. G.J. Lloyd and Dr. D. Hoffman are estimating the degree of pronation and supination in patients by using torque wrenches and the effect of Collis fracture upon this movement. Dr. J.G. Evans is continuing his study of the incidence of the fractured neck of the femur in the elderly, and his follow-up study of total hip replacement at St. Michael's Hospital. He is also investigating the use of hinged orthotic appliances in the treatment of lower limb fractures and the possible association of epiphyseal joint disease in degenerative spinal disease. Dr. John McCulloch is actively pursuing studies in the Department of Anatomy relating to alterations in blood-flow of the bone produced by disease in injury.

Neurosurgery (Dr. T.P. Morley, Chairman)
At the Wellesley Hospital a neurosurgical intensive care unit, an operative stereotaxic facility, and a neurodiagnostic laboratory have been established in co-operation with the Division of Neurology in that hospital, for clinical care and research. The following investigations are in progress: Dr. Kenneth Livingston: (*a*) continuing study of central modulation of visceral reflex activity, and (*b*) a study of the central effects of intravenous procaine. Dr. Robert Tym: (*a*) exploration of mathematical models of tumour growth, and (*b*) construction of model to simulate factors in blood flow during rises in intracranial pressure. Dr. R.R. Tasker: the anatomy and biochemistry of rest tremor in monkeys – (i) the interaction of drugs and brain lesions in the production of tremor, and (ii) the production of tremor by lesions of the caudate nucleus and tegmentum. Dr. H.J. Hoffman: (*a*) an investigation into the treatment of hydrocephalus in dogs, (*b*) a clinical study of the results of surgical treatment of hydrocephalus, and (*c*) a clinical review of third ventricular tumours in childhood. Dr. J.F.R. Fleming is investigating cerebrospinal fluid dynamics with intrathecally administered radioactive tracers. Dr. A. Hudson is studying the physiology of peripheral nerve regeneration and healing in experimental animals and in man. Dr. C.H. Tator is continuing productive studies of the diagnosis and chemotherapy of brain tumours. He has also basic research in progress on the effect of local hypothermia, steroids, and diuretics on spinal cord trauma. Dr. R.G. Vanderlinden is studying the role of C-fibre activity and its central connections in the production of pain. Dr. William Lougheed is conducting an active productive clinical investigation of intracerebral aneurysms. Dr. E. Bruce Hendrick, in collaboration with Dr. H.J. Hoffman and James L. Hiscox, is continuing his study of cerebral abscesses in infancy.

General Surgery (Dr. N.A. Watters, Chairman)
Dr. D. Bohnen is performing clinical evaluations of his operative technique for the repair of large hernial defects in the abdominal wall and of a new approach for cholecystectomy. Dr. D.J. Currie has completed a very important and convincing study of the value of post-operative peritoneal lavage in the management of diffuse peritonitis. This study was performed in association with Drs. J.P. McKenna, J.A. MacDonald, L.J. Mahoney, D.C. Finlayson, and J.C. Lanskail. He is continuing his study on the pathogenesis of cholelithiasis and cholecystitis. In collaboration with Dr. Bhagwat, he is studying the electron microscopic appearance of normal human liver cells. Dr. M.I. Davis, in collaboration with Dr. I. Sanderson and Dr. G. Hiraki, has performed a clinical pathological study of benign cystadenoma of the pancreas. Dr. W.R. Drucker, with Dr. G. Farago and Dr. T. Lau, is continuing his studies of the metabolic alterations that occur with persisting hypovolemic shock. Dr. Farago is

studying the mobilization of free fatty acids during hypovolemia. Dr. T. Lau, in collaboration with Dr. A.M. Rappaport in the Department of Physiology, has applied a newly developed technique for obtaining blood directly from the pancreas to study insulin secretion during haemmorhagic shock. Dr. S. Ein is conducting a prospective study of treatment of diaphragmatic hernias in newborns with and without the use of silon sheeting; and of the disappearance of intra-abdominal free air after laparotomy in children. He is also reviewing liver tumours and omphaloceles and gastroschisis. Dr. R. Falk is continuing his very productive work on cell mediated immunity; the interaction of sinusoids and bone marrow cells with antigen, and the basis of co-operation between these two cell types. A technique has been developed through his laboratory which assesses the development of cell mediated immunity as related to renal allograft rejection. This technique would appear to have predictive value. In addition, the study of hypersensitivity to streptococal antigens as related to the pathogenesis of rheumatic heart disease is being continued. In collaboration with Drs. Langer and Tovee, studies on hepatic transplantation in dogs are in progress. Dr. G. Haraki, in collaboration with Dr. K. Givan, is studying wound infections following gastric surgery, and, in collaboration with Dr. F.H. Sims, has a laboratory project in progress on the relationship of pancreatic function to the development of experimental atheroma in the rabbit. Dr. I. Koven, in collaboration with Dr. B. Gallie and Dr. V. Taubenfligiel, is continuing his original work on changes in the diffusion characteristics of interstitial fluid during hypovolemic shock. He is also collaborating in the work on the release of insulin and free fatty acids during shock. In collaboration with Dr. C. Ezrin and Dr. G. Steiner, he is studying the effect of thyroxine in the reduction of obesity and the effect of this therapeutic regimen on body fluid compartments. Dr. R.E. Matthews is continuing his investigations of extracellular fluid changes in elective surgical patients. He has organized an intensive care unit which is now functioning as a well-organized clinical and investigative unit for traumatized patients. In collaboration with Drs. Cotton, Douglas, and Koven, he is continuing work on the evaluation of the methodology for studies of interstitial fluid. Dr. J. McIntyre and Dr. M. Dietel have a well-organized project for intravenous alimentation. Dr. J. Palmer is performing a detailed analysis of his extensive clinical experience with parathyroid adenomas. Dr. J. Provan is evaluating the use of 1.125 Labelled Fibrinogen in the diagnosis of thrombophlebitis. This study is combined with the evaluation of Dextran 70 in the prevention of post-operative thrombophlebitis in patients undergoing operations on the hip. In conjunction with Dr. J.W. Davidson, the Department of Radiology, his study of the etiology of venous pathology is in progress, particular attention being directed to the lymphatic circulation. The role of arterio-venous fistulae in the etiology of varicose veins is also under investigation. Dr. H.F. Robertson, associated with Professor Serge Dmitrevsky, is working on a method for the measurement of transthoracic electrical impedance that may be applicable to a study of pulmonary insufficiency and early pulmonary edema. Dr. I.B. Rosen is studying the technical feasibility of human pancreatic transplantation. Dr. B. Shandling is completing his work on the isolated porcine liver perfusion that determined: (*a*) the effect of a pulsatile flow in the hepatic artery, and (*b*) whether perfusion of the portal vein with blood of low pO_2 is preferable to the use of arterial blood. The use and clinical application of a tissue pH probe is under study. Dr. J.S. Simpson is reviewing the conservative treatment of splenic trauma; and of children operated for bronchiectasis. Dr. C.A. Stephens, with Dr. C.G.F. Seagram, is performing a retrospective study of peptic ulceration at the Hospital for Sick Children. Dr. W. Zingg has made major advances in the development of the Membrane Oxygenator for use in paediatric surgery. He continues his studies of the biorheology of blood, hyperthermia, and experimental foetal surgery.

Cardiovascular Surgery (Dr. W.G. Bigelow, Chairman)

Dr. R.J. Baird has an extensive programme of investigation of the physiological benefits of myocardial revascularization and clinical studies of surgery for ischaemic heart

disease. Dr. W.G. Bigelow continues to co-ordinate and direct productive research activities in this division. Dr. B. Goldman is conducting a laboratory project into the mechanisms of canine cardiac allograft rejection in association with Dr. M. Mullerworth from Australia and Dr. J. Crookston from the Department of Medicine. This clinical work involves the development of the Toronto General Hospital Pacemaker Clinic, analysis of surgery for patent ductus arteriosus (with Dr. L. Black), a study of blood stream infection associated with indwelling intravenous catheters (with Dr. N. Colapinto), and a study of the functional and metabolic effects of anoxic cardiac arrest. Dr. J. Hart is studying the techniques and problems associated with microvascular surgery with particular relevance to coronary artery reconstruction. Dr. R. Heimbecker, in association with Dr. K. Richards and Dr. M.D. Sokol, has developed an experimental model for study of visceral artery ischaemia and is now in the process of following acute and chronic studies. His work on the microscopic observation of capillary circulation data is continuing, with particular emphasis on the pulmonary microcirculation. Clinical application of a membrane oxygenater has revealed promising results. He is continuing his studies of left ventricular function in myocardial infarction and in heterotopic transplantation. Dr. W. Mustard and Dr. G. Trusler continue their studies of homograft and heterograft valves and Dr. Trusler continues his studies of the relative effects of pulmonary valve insufficiency in pulmonary stenosis upon the haemodynamics in dogs. Dr. A.S. Trimble, with the assistance of Dr. V. Mehta and Dr. D. MacGregor, is investigating the availability of myocardial oxygen during open-heart surgery. The feasibility of a simple monitoring device to document the tolerance for anoxic arrest during open-heart surgery is under study, utilizing a new platinum electrode developed by Dr. J. Kryspin of the Institute of Bio-Medical Engineering. Patients with fascia lata valves are returning from haemodynamic reassessment in association with cardiologists. The first International Roundtable on Fascia Lata Heart Valves was organized by Dr. Trimble, with the support of the Medical Research Council, the Provincial Department of Health, and the Ontario Heart Foundation. A study on the affects of antibiotic soakage on the preservation of fascia lata is nearing completion. Dr. J.K.Y. Yao is continuing his work on atrial pedicle graft in the management of complete heart block, and his studies on cardiogenic shock, utilizing counter-pulsation techniques to improve haemodynamic survival rates.

HONOURS

Dr. W.R. Drucker, Visiting Professor, Tulane University, New Orleans; Sommer Memorial Guest Lecturer; elected Chairman of the Surgical Forum Committee, American College of Surgeons.

Dr. G.A. Farrow, Canadian Urological Association prize essay (with Dr. W. Wagner).

Dr. R.J. Ginsberg, McLaughlin Travelling Fellowship (1970); Visiting Professor, Department of Thoracic Surgery, University of Texas Medical Branch, Galveston, Texas (1970).

Dr. R.W. Jackson, Lister Prize in Surgery, 1970, University of Toronto.

Dr. I. Macnab, Visiting Professor, University of Florida, Gainesville; Surgeon-in-Chief *pro tem*, Rhode Island Hospital.

Dr. F.G. Pearson, Visiting Professor, Maine Medical Centre, Portland.

Dr. G.N. Ranking (and Dr. G.A. Harry), Prize Essay, Canadian Urological Association, 1970.

Dr. R.B. Salter, Awarded the Order of the Academic Cane for 1971 by the Department of Orthopaedic Surgery, University of Southern California, Los Angeles; elected a Corresponding Fellow of the British Orthopaedic Association.

Dr. J. Schatzker, Winner of the Edward Samson Award, the Canadian Orthopaedic Association for best Orthopaedic Research in 1970 on the subject of "Non-unions of the Odontoid Process on Experimental Investigation."

SCHOLARLY ADDRESSES

Dr. M. Barkin, "To Alter the Antigenicity of a Graft," and "The Prune Belly Syndrome," Northeastern Section of the American Urological Association, Hershey, Pennsylvania.

Dr. W.G. Bigelow, "Cardiovascular Disease," University of Saskatchewan; Guest Speaker Academy Day, Academy of Medicine, Ottawa; "Heart Transplant," panel, Essex County Medico-Legal Society, Windsor; Chairman, "Revascularization," panel, American College of Surgeons, Montreal.

Dr. G.T. Cook, "Cloacal Extrophy," Canadian Urology Association, Halifax; "Cystitis in Children and Adults," College of Family Practice, Toronto.

Dr. D.J. Currie, "Emergency Care of the Critically Injured," oma, Ottawa.

Dr. F.P. Dewar, "Charnley Total Hip Prostheses," Hospital for Special Surgery, New York; "Weight Transmission Through the Knee Joint," "Endoskeletal Transcutaneous Prostheses in Amputees," Canadian Orthopaedic Association, Jasper.

Dr. W.R. Drucker, "Carbohydrate Metabolism in Injury," Columbia University; "The Role of Insulin in Tolerance for Hemorrhagic Shock," Tulane University; "Shock and Metabolism," American College of Surgeons, Chicago; "What's New in Shock," Association Academic Surgery, Denver; "Carbohydrate Metabolism – Traumatized vs. Normal States," Symposium on Hyperalimentation, San Antonio; "Changing Patterns of Residency Programs," Wayne State University; "Influence of Sociological Change on Medical Education in Canada," Johns Hopkins Medical and Surgical Society, Baltimore; "The Influence of National Insurance Programs on Graduate Education in Ontario," Whipple Society, New York; "Immunotherapy for Granulamatous Enteritis," Section Meeting, Montreal, American College of Surgeons; "Tolerance of Hemorrhagic Shock," "Role of Insulin in Metabolic Response to Shock – Postoperative Alterations in Nutrition," Sommer Memorial Lecturer, Portland; "The Question of the Irreversibility of Shock," Office of Naval Research, University of Miami.

Dr. R.E. Falk, "*In Vitro* Assessment of Thymus-Bone Marrow Interaction," National Institute of Medical Research, Mill Hill; "*In Vitro* Assessment of Thymus-Bone Marrow Interaction," Karolinska Institute, Stockholm; "Measurement of Cell Mediated Immune Reactions," Royal Victoria Hospital, McGill University; "Cellular Immunity," Lecturer and Participant, Middlesex Medical School and British Society of Immunology; "Assessment of Cellular Immunity," Clinical Disease Institute of Orthopaedics, Royal National Orthopaedic Hospital, Brockley Hill, Stanmore; "Immunology and White Cell Culture," University of British Columbia.

Dr. G.A. Farrow, "Surgical Complications – Renal Homotransplantation," Kergin Surgical Society, Edinburgh; "Renal Homotransplantation," Istanbul, Turkey; "Combined Approach in Recurrent Stress Urinary Incontinence," Canadian Urological Association, Quebec.

Dr. J.F.R. Fleming, "Biomedial Prefrontal Leukotomy – The Relief of Tension, Anxiety, Fear or Depression in Neurotic or Psychotic Illness," International Conference on Psychosurgery, Copenhagen; "csf Scanning in the Evaluation of Hydrocephalus: A Clinical Review," International Symposium on Cysternography and Hydrocephalus, Washington, D.C.

Dr. W.R. Harris, "Epidemiology of Industrial Amputations," Conference on Accident Prevention and Rehabilitation, Johannesburg.

Dr. D.E. Hastings, "The Injured Knee," Grey Cup Symposium on Sports Medicine; "Rheumatoid Hand Deformities," American Academy of Orthopaedic Surgeons; "Rheumatoid Hand Deformities," Canadian Orthopaedic Association, Jasper, Alberta; "Surgery of the Rheumatoid Hand," Jasper (manus of Canada); "Surgery of the Rheumatoid Hand," Operating Room Nurses Convention; "Athletic Injuries," National Athletic Trainers Association.

Dr. R.O. Heimbecker, "The Role of Emergency Infarctectomy in the Treatment

of Acute Myocardial Infarction," "Symposium on the Surgical Treatment of Coronary Artery Disease," International Congress of Diseases of the Chest, Lausanne, Switzerland; "Surgery for Acute Myocardial Infarction," World Congress of Cardiology, London, England; "The Present Status of Pulmonary Embolectomy," Johns Hopkins Hospital, Baltimore; "Surgery for Myocardial Infarction," and "Surgery for Ventricular Aneurysm," American College of Cardiology, Bethesda, Maryland; "Surgery for Myocardial Infarction," Pennsylvania Heart Association, Pittsburgh, Pennsylvania.

Dr. R.W. Jackson, First Visiting Research Professor, Department of Orthopaedic Surgery, Mayo Clinic, Rochester, Minnesota; "Arthroscopy," Massachusetts Medical Society; "Arthroscopy," New England Orthopaedic Society; "Arthroscopy of the Knee," University of Minnesota.

Dr. R.D. Jeffs, "Experience with improved bed wet detector for enuresis," and "The Prune Belly Syndrome," Northeastern Section of the American Urological Association, Hershey, Pennsylvania; Guest Speaker, Combined Meeting of Pediatrics and Urology University of Ottawa, Symposium on Pediatric Urology, Stanford University, Palo Alto, California; Guest Speaker, North West Urological Society, Vancouver, B.C.

Dr. W.K. Kerr, "Prognosis in Reconstructive Surgery," British Association of Urological Surgeons, Glasgow, Scotland; "Are Tryptophan Metabolites Carcinogenic?" Canadian Urological Association, Quebec City; "Surgical Salvage of the Tuberculous Kidney," International Society of Urology, Tokyo, Japan; "Homostasis in Pelvic Surgery," Society of Pelvic Surgeons, Houston, Texas.

Dr. I.H. Koven, "The Improvement of Interstitial Tissue Diffusion by Salt Solution in Haemorrhagic Shock," Royal College of Physicians and Surgeons of Canada, Ottawa; "The Significant Role of Interstitial Tissue in Hemorrhagic Shock," European Society for Experimental Surgery, Helsingborg, Sweden; "Reversibility of Cellular Injury Due to Inadequate Perfusion," Conference Reversibility of Cellular Injury, Office of Naval Research, University of Miami; Symposium on Shock, Kitchener, Ontario.

Dr. K.E. Livingston, "A proposed re-orientation of the Limbic system concept," "The Central Modulation of Visceral Reflex Activity" and "The Central Effects of Intravenous Procaine Hydrochloride – A Rationale for Clinical Evaluation," Mexican Neurological Society, Mexico City.

Dr. I. Macnab, Danforth Oration, Rhode Island Hospital; "Chemonucleolysis," Jones Memorial Lecture, Philadelphia; "Symposium on Cervical Pain," Wenner-Gren Institute, Stockholm; "Anterior Compartment Syndrome" and "Porous Vitallium Implants," Duke University, North Carolina.

Dr. R.E. Mathews, "Newer advances in the Pathophysiology and Treatment of Shock," Kitchener, Ontario; "Newer Concepts of the Prevention and Treatment of Shock," Bracebridge, Ontario.

Dr. T.P. Morley, "The Neurological Examination," Halifax, Nova Scotia; "The Results of Proximal Anterior Cerebral Artery Occlusion in Aneurysms of the Anterior Communicating Artery," Neurosurgical Society of America, Sea Island, Georgia.

Dr. F.G. Pearson, "Preoperative Investigation of Carcinoma of the Lung," American College of Surgeons, Chicago; "Detection and Management of Tracheal Stenosis following Cuffed Tube Tracheostomy," Society of Thoracic Surgeons, Dallas, Texas; "Primary Malignant Tumours of the Trachea" and "Carcinoid Adenoma of the Bronchus," Royal College of Physicians and Surgeons, Ottawa; Visiting Professor, Maine Medical Center, Portland, Maine; "Treatment of Strictures of the Esophagus," American College of Surgeons, Montreal; "Gastroplasty and Hiatus Hernia Repair," and "Post-Tracheostomy Stenosis," Janes Surgical Society Vancouver, B.C.; Visiting Professor, University of Alberta.

Dr. C.J. Robson, Guest Lecturer, Postgraduate Seminar, New York Section American Urological Association Postgraduate Seminar; Guest Speaker at the Na-

tional Meeting of the American Cancer Society on Renal Tumours, Arizona; Guest Speaker Postgraduate Course, Urology, University of Alberta; Chairman, Panel, Sexuality Sectional Meeting, American College of Surgeons, Montreal.

Dr. R.L. Ruderman, "The Effect of Intestinal Resection on Gastric Acidity in the Rat," Surgical Forum, American College of Surgeons, Chicago; "Experimental Evidence in Rats of the Pathogenesis of Gall Stones," Association for Academic Surgery, Denver, Colorado.

Dr. R.B. Salter, 1971 Wallace Duncan Lecture, Case Western Reserve University, Cleveland; Visiting Lecturer, Laval University; Visiting Lecturer, Baylor Medical College, Houston.

Dr. J. Schatzker, "Fractures of the Odontoid Process and their non-union," Canadian Orthopaedic Association, Jasper; "Fracture Dislocation of the Talus," Academy of Medicine, Toronto; "Push out strength of screws in an unloaded system," Toronto; "Place of the intertrochanteric osteotomy in the treatment of the osteoarthritic hip," Toronto; "Guidelines to the AO method of internal fixation," The AO Course, Davos, Switzerland; "Supracondylar fracture of the femur," and "Failure of metallic implants."

Dr. M. Schwartz, "Uptake of Hydrocortisone in Experimental Mouse Ependymoblastoma," Society of Neurological Surgeons, Boston.

Dr. E.H. Simmons, "Surgery of the Spine in Rheumatoid Arthritis and Ankylosing Spondylitis," Symposium on Surgery of Arthritis, McGill University; "Soft-Tissue Injuries of the Cervical Spine in Athletes," and "Recurrent Subluxation of the Patella in Childhood and Adolescence," The American Academy of Orthopaedic Surgeons, Buffalo, New York; "The Musculoskeletal Manifestations of Caisson Disease Part I and Part II," The American Academy of Orthopaedic Surgeons, San Francisco; "The Management of the Painful Back," and "Anterior Cervical Discectomy and Fusion – a Clinical and Biomechanical Study," Atlantic Provinces Orthopaedic Society, St. John, New Brunswick; "A Clinical and Biomechanical Study of Anterior Spinal Instrumentation," Association of Bone and Joint Surgeons, Madrid, Spain; "A Clinical and Biomechanical Study of Anterior Spinal Instrumentation," Canadian Orthopaedic Association, Jasper.

Dr. W.J.E. Spence, "Some Surgical Aspects of Tropical and Parasitic Diseases," All Canada Meeting on Tropical and Parasitic Diseases and Health, Ottawa.

Dr. G.A. Taylor, "Shock Lung," Ontario Thoracic Society, Toronto; "Pulmonary Embolism," Ontario Medical Association, Toronto; "Hypoperfusion Lung Syndrome," Canadian Medical Association, Halifax.

Dr. R. Tym, Visiting Professor, University of Salisbury, Rhodesia.

Dr. J.J.K. Yao, "Cardiac Transplantation," Ontario Society of Medical Technologists, Toronto; Panel on Heart Transplantation, Ontario Heart Foundation, Toronto; "Immunosuppressive Therapy in Heart Transplantation," Canadian Society of Hospital Pharmacists, Toronto; "Hemorrhage after open-heart Surgery," Canadian Society of Extra-corporeal Circulation Technicians, Toronto,; "Peripheral Vascular Surgery," Timmins, Ontario.

PUBLICATIONS

Baird, R.J. Comment on Paper by J.A. Mannick, L.E. Williams, and A.C. Nasbeth "The Late Results of Axillofemoral Grafts" (*Surgery*, vol. 68, 1970, p. 1038).

——— Comment on Paper by D.B. Skinner, *et al.* "Surgery for Acute Myocardial Infarction" (*ibid.*, p. 134).

——— Comment on Paper by H.C. Urschel, M.A. Razzuk, E.R. Miller, M.J. Nathan, R.J. Ginsberg and O.L. Paulson "Direct and Indirect Myocardial Revascularization – Follow-up and Appraisal" (*ibid.*, p. 1099).

——— Comment on Paper by A.R. Wychulis, J.A. Spitell and R.B. Wallace "Papliteal Aneurysms" (*ibid.*, p. 952).

Baird, R.J. (with Ameli, F.M.) "The Effect of Localized Epicardiectomy on Myocardial Infarction on Intramyocardial Pressure"; in *Proceedings of the 23rd annual meeting of the Canadian Cardiovascular Society*, Ottawa, 1970, p. 48).

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